出國報告（出國類別：參訪）

參加 21th InternationalConference on Soil,Groundwater Remediationand Excavation 及訪問德國魯爾工業區污染土地再利用場址

服務機關：行政院環境保護署
姓名職稱：許位嘉助理管理師
派赴國家：德國
出國期間：108 年 5 月 19 日至 108 年 5 月 26 日
報告日期：108 年 8 月 19 日

摘要

土壤，地下水修復和挖掘國際會議匯集多種領域科學家、研究人員和學者，就土壤、地下水修復和開挖與其他多種領域的專業知識進行經驗和研究成果交流，透過跨學科平台模式展示和討論最近的創新、趨勢和關注事項，以及在土壤，地下水修復和挖掘領域遇到的實際挑戰和解決方案。

結合本次本署發表之原台金場址污染土地再利用案例，及德國魯爾區過往煤礦及鋼鐵工業發展與後續成功轉型開發歷程，故選定相關場址進行現地考察，作為後續我國政策與法規之度修正之參採借鏡。

目次

圖目錄

一、參訪目的

土壤，地下水修復和挖掘國際會議匯集多種領域科學家、研究人員和學者，就土壤、地下水修復和開挖與其他多種領域的專業知識進行經驗和研究成果交流，透過跨學科平台模式展示和討論最近的創新、趨勢和關注事項，以及在土壤，地下水修復和挖掘領域遇到的實際挑戰和解決方案，藉由本次彙整「105 年污染土地再利用場址規劃與制度管理計畫」計畫成果，以我國污染土地再利用示範案例，發表主題為「A Case Study of Brownfield Revitalization in Taiwan」，投稿本次研討會並進行口頭發表。

參訪的案例皆是隨著工業發展而興盛的地區，是當時地方居民所仰賴的經濟來源與生活重心，但在缺乏環保意識的時空背景下，工業發展對環境造成嚴重的衝擊，使得自然資源浩劫也遺留大片的污染土地。借鏡北杜伊斯堡景觀公園與關稅同盟礦區過去工業對土地與生活環境的影響，將永續發展納入開發考量，成功讓經濟與環保達到平衡，並使人民得以長久居住在這片土地上。

二、行程摘述

日期	工作內容概要
5/19（日）	去程
5/20（一）	抵達德國
5/21（二）	參加第 21 屆土壤、地下水修復和開挖國際會議第 1 天海報發表。
5/22（三）	參加第 21 屆土壤、地下水修復和開挖國際會議第 2 天會議。
5/23（四）	前往杜伊斯堡實地考察（北杜伊斯堡景觀公園、杜伊斯堡內港）
5/24（五）	前往埃森實地考察（關稅同盟煤礦工業建築群、魯爾博物館）
5/25（六）	回程
5/26（日）	抵達臺灣

三、參訪成員

項次	姓名	性別	單位及職稱
1	許位嘉	男	行政院環境保護署土污基管會管理師

四、 過程及行程成果

（一）參加第 21 屆土壤、地下水修復和開挖國際會議（21th InternationalConference on Soil,Groundwater Remediationand Excavation）：

世界科學、工程與技術學院（World Academy of Science, Engineering and Technology, WASET）是一個開放的科學研究組織，致力於提升科學、工程與技術的發展，擁有國際標準名稱識別（ISO 27729）、虛擬國際權威檔（VIAF ID:134726554）與國際線上圖書館電腦中心（OCLC 碼:711803673）。學院宗旨為支持、促進、保存、擴展與傳播科學、技術、藝術與人文等學術領域，同時開啟多元創新與研究的發展。

其中土壤及地下水整治國際研討會旨在匯集各個先進國家的學術科學家、研究人員和研究學者，就土壤及地下水整治領域進行交流和分享他們的經驗與研究成果。此外，研討會提供研究人員、從業人員和教育工作者一個重要的跨學科平台，展示創新、趨勢和關注議題來進行交流，以及在土壤及地下水整治領域遇到的實際挑戰和解決方案。

本次會議內容廣泛且豐富，口頭發表共分成四場次進行，另外還有許多以數位展示之研究成果，相關議題包含應用鉑含浸鎂鋁複合層氫氧化物處理氰化物廢水、評析植生復育去除土壤砷污染之成效、硫化檸烯多硫化物管柱過濾器在污染廢水中去除汞之研究、評析植物根過濾去除砷污染於綜合廢水與天然水之成效、應用聚多巴胺改良 ZSM-5 沸石去除綜合廢水汞污染之成效、應用 Salix schwerinii 萃取土壤銅與鎳污染之成效、四種柳樹受石灰與木灰改質之土壤鋅污染提取效益評估與生長變化，以及永續管理技術-Jordan 廢水處理廠提升能源效益之案例探討等，主要為土壤及廢水處理技術之研究，以下簡述幾篇內容：

1. 評析植生復育去除土壤砷污染之成效

土壤砷污染對人類的健康具有嚴重的影響，其具有生物累積性且可透過食物鏈轉移。在厄瓜多爾 Tungurahua 省火山山腳種植的馬鈴薯中可發現，砷濃度達 0.0423 mg/kg，由於厄瓜多爾的砷污染主要來自於採礦活動，採金過程會產生有毒的含汞尾礦，在 Azuay 省，採礦活動造成土壤砷濃度達到 2,500 mg / kg~6,420 mg / kg，而在 Tungurahua 省，由於火山爆發造成砷濃度為 6.9 mg / kg~198.7 mg / kg。面對砷污染的問題，目前研究主要以植生復育技術整治 Azuay 省和 Tungurahua 省的土壤，並建立砷在土壤-植物系統的萃取方法。該方法包括兩種植物，其在 60 μMAs 的合成溶液中具有最佳的除砷能力，以及較低的死亡率與抗水耕性，因此選定早熟禾屬和大車前草，因為其砷去除率高達 55%和 67%，死亡率分別為 9%和 8%。每種植物中的砷濃度取 10 mL 等分試樣後使用電感耦合等離子體-發射光譜法（ICP-OES）設備進行分析。並使用毛細管法將合成溶液調配 13 mg/kg 和 15 mg/kg 的砷污染土壤。後續使用兩種植物進行 7 週的試驗，評估土壤中砷濃度的減少情形。為測量土壤-植物系統中砷濃度的變化，使用 Rhizo 和 Wenzel 砷提取方法，並使用 ICP-OES（optima 8000 Pekin Elmer）進行分析。實驗結果顯示，Azuay

省土壤試驗中，初始砷濃度為13 mg/kg，在使用早熟禾屬和大車前草7週後，濃度分別達到 11.49 mg/kg 和 11.04 mg/kg，而初始砷濃度為 15 mg/kg，在處理後濃度分別達到 11.79 mg/kg 和 11.10 mg/kg；Tungurahua 省土壤試驗中，初始砷濃度為 13 mg/kg，在使用早熟禾屬和大車前草 7 週後，濃度分別達到 11.56 mg/kg 和 12.16 mg/kg，而初始砷濃度為 15 mg/kg，在處理後濃度分別達到 11.97 和 12.27 mg/kg。

2. 硫化檸烯多硫化物管柱過濾器在污染廢水中去除汞之研究

在厄瓜多爾礦業發展對當地水源產生重大的影響，為改善此類污染問題，混汞法為常見的應用方法。由於汞為神經毒性物質，即使在低濃度下仍會對人體健康造成影響，因此本研究採用具汞去除能力之聚合物-硫化檸烯多硫化物（Sulfur-Limonene Polysulfide, SLP）製備含有 SLP 包覆的顆粒介質，應用於實驗室規模的柱型過濾系統。從初步的結果可得知，使用長 20 cm 與直徑 5 cm 的管柱，在 119 m/day 的平均孔隙流速下，可達到二價汞 85%的去除率。此外，在洗脫管柱時，發現二價汞被永久吸附在 SLP 包覆的顆粒上，而使用未包覆顆粒的管柱，則發現二價汞可於固相逆流。由於現階段研究的執行重點為最佳化 SLP 的合成，以及多孔介質中包附膜的聚合物含量，期能改善二價汞的去除效果，並延長管柱過濾器的使用壽命。

3. 四種柳樹受石灰與木灰改質之土壤鋅污染提取效益評估與生長變化

土壤重金屬（如銅、鋅、鎳）污染是全世界重要的環境問題之一，鋅是植物生長中的重要元素，但過量濃度可能對植物生存造成影響，受重金屬污染的土壤也可能對人類健康造成危害。由於柳樹林對於降低土壤中金屬毒性濃度，以及恢復污染場址的生態系統，具有良好的潛力，因此研究擇定柳樹進行實驗，在溫室試驗中測試從芬蘭礦區採集的鋅污染土壤，並利用4種柳樹品種進行鋅污染吸收，以及觀測植物生長，評估植物提取的效率。其中連續萃取技術和電感耦合等離子質譜儀（ICP-MS）用於量測可萃取的金屬。整個實驗過程中，柳樹對嚴重污染的土壤表現出極佳的抗性，吸收總平均鋅濃度範圍為 776 mg/kg ~ 1,823 mg/kg。所有品種的鋅污染平均吸收百分比範圍為 97%~223%。添加石灰和木灰對大多數品種的植物生長和鋅的吸收百分比則有正面影響，實驗結果顯示，柳樹品種具有積累和吸收大量鋅污染的潛力，可應用於污染土壤的生態恢復；因此，利用柳樹進行植物萃取和產生生物能源，具有相當大的意義。

4. 永續管理技術-Jordan 廢水處理廠提升能源效益之案例探討

為改善 Jordan 的城市污染系統，提高污水處理廠的能源效率，進而降低電力消耗所產生的費用，因此選擇 Jordan 城市內三個污水處理廠作為調查的案例。此三處污水處理廠被選定的原因為其處理能力和尺寸都接近平均值；此外，這些設施近期皆有進行能源評估。透過此案例研究，成功提高污水處理廠的能源使用效率。透過本案例研究，可以透過操作效能的最佳化、鑑別與消除缺陷、適當管理可顯著提高能效。技術性永續管理是一種

低成本，且相對可以提高能源效率，並符合所有法律面和技術面要求，將處理流程最佳化，以及提高工作安全性和方便的工作條件。本研究後續會評估將此方法納入其他區域和產業，將適用約旦條件的技術性永續管理概念可以擴展到 Jordan 所有地區的其他污水處理廠，也可以擴展到其他產業，包括水處理、配水、廢水網絡、海水淡化或化學工業。

5. 成果發表

本次發表內容為介紹國內褐地場址活化制度與案例應用，因我國地狹人稠而土地資源有限，因此期能透過褐地活化制度加速場址污染改善與恢復土地利用價值。分享案例為受到礦業污染之場址，因當地自然環境豐富，人文歷史遺跡保留完整，因此富有獨特景緻吸引許多觀光人潮，然觀光資源因污染土地而發展受限，為活化土地資源與解決環境污染問題，同時藉以推動國內污染土地活化政策，故選定案例場址進行土地再利用規劃。

場址活化策略應用土地適宜性分析與風險地圖建置，進而擬定風險管理措施與土地再利用空間規劃。其中土地適宜性分析係蒐集環境現況因子（環境敏感區位、生態資源、土地使用情形、污染情形、文化景觀等），以評估場址合適發展之區域；風險地圖建置則進行場址污染調查工作，以調查結果進行風險評估並繪製場址健康風險分布圖，使規劃者得掌握標的污染物與影響受體。案例場址以土地適宜性分析劃定四塊發展地區，分別為優先發展、一般發展、條件發展與限制發展，結合風險地圖呈現場址西南側與東側有較高風險之結果，以及採取「全區土地不開發」之生態保育方案，規劃再利用方案為 A 區公共設施、B 區入口意象、C 區視覺景觀、D 區既有建築保存、E 區十三層遺址及 F 區廢煙道遺址。另搭配風險管理措施，分別為持續污染改善、暴露途徑阻絕與行政管理，適當開放空間使民眾進入參觀，除可達到再利用活化之目的，對人體及環境健康影響亦降至最低。發表照片與研討會現場情況如圖 1 所示，參加證書如圖 2 所示。

圖 1. 研討會現場情況與發表過程照片


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MAY 21-22, 2019

圖 2. 研討會參加證書

（三）訪問德國魯爾工業區污染土地再利用場址：

本次參訪行程安排兩天在杜伊斯堡與埃森地區之參訪行程，分別在 5 月 23 日參觀位在杜伊斯堡之 Landschaftspark Duisburg-Nord 北杜伊斯堡景觀公園以

及 Duisburg Inner Harbour 杜伊斯堡內港，5 月 24 日則是參訪 Zeche Zollverein 關稅同盟礦區以及參加魯爾博物館之導覽。

1. 北杜伊斯堡景觀公園

北杜伊斯堡景觀公園位於德國杜伊斯堡區內，為著名的埃姆舍公園之一，面積達 2.3 平方公里，當地工業發展於 1899 年，當時 Friedrich Thyssen 公司在當地建起第一個礦井，1905 年成立煉焦廠，並帶動大量的鋼鐵生產，直至 1959 年礦井關閉，1977 年煉焦廠也隨之關閉，並於 1980 年拆除，因此 A. G. Tyssen 鋼鐵廠也於 1985 年廢棄，當時已生產 3700 萬噸的生鐵，帶動過去輝煌的經濟發展，然而也留下嚴重污染問題，土壤中含有大量的砷與氰化物，此外也影響一旁的埃姆舍河與其支流，由於埃姆舍河流經整個工業區，無數工業廢水排入其中，形成長達 400 公里的污染帶，影響當地的生活品質，同時周邊的生態也因為大量污染造成生物稀少。當時整個礦區為 Friedrich Thyssen 公司的資產，直至 1989 年轉交給北萊茵威斯特法倫州政府，由於全區的廠房與設施規模龐大，考量拆除重建成本、污染整治成本，以及管理費用都是巨額的支出，最終北杜伊斯堡政府決定將工廠改造為公園，使其成為埃姆舍公園的一部分（圖 3.），並於 1990 年起開始規劃設計，直至 1994 年逐步開放公園給民眾使用。

圖 3. 埃姆舍公園與北杜伊斯堡景觀公園位置示意圖

在 1989 年北萊茵威斯特法倫州政府透過房地產基金買下鋼鐵廠，並成立開發公司，由於當地具有歷史發展的記憶，以及地方團體將部份工業設施視為紀念碑，因此杜伊斯堡市將此地劃為公園用地，保留這些設施，包含建築、礦渣堆、煙囪、鼓風爐、鐵路、橋梁、沉澱池、起重機等，期望能重新定義用途與延伸功能，以及作為教育之場地。對於當地的土壤污染處理，高污染地區採用離場處理，其他低污染部分則是將污染物燒結深埋後再用新土覆蓋。

此地發展被納入國際建築展埃姆舍公園計畫的綠色框架主題中，並於

1990 年舉辦國際設計競賽，1991 年公布競賽結果，遴選 PeterLatz 事務所「後工業景觀」的設計規劃。北杜伊斯堡景觀公園的特色是保存工業文化的價值，作為工業發展的歷史痕跡見證，全區設計使用保留的各種工業設施，提供參觀導覽、服務中心、餐飲、運動、集會、表演、休閒、娛樂等多項功能。廠區各個地方皆有掛上解說牌，介紹過去設施生產流程與運作方式等，提供教育的意義，廠內的煤氣儲罐則改建為人工潛水中心，提供遊客使用，原本作為儲存煤礦跟焦碳的倉庫擇改造為攀岩、兒童設施與展覽等綜合活動場所，而原為動力中心的大型建築，用來辦理大型國際展覽、會議、音樂會等公共活動，參訪當天即有 Red Bull 公司在此辦理活動，一旁的配電站則作為旅客服務中心與餐廳使用，並開放 5 號高爐給遊客攀爬，可到最高 70 公尺處觀賞景觀公園全景；此外，舊辦公大樓也改造為青年旅舍提供給遊客使用。場址參訪情形詳圖 4. 所示。

(A) 動力中心-大型公共活動

(B) 煤氣儲罐-人工潛水中心

(C) 高爐製程介紹

(D) 5 號高爐-瞭望台

(E) 沉澱池

(F) 冷卻塔

圖 4. 北杜伊斯堡景觀公園參觀情形

3. 杜伊斯堡內港：

杜伊斯堡內港為德國境內最大的內河港，也是世界第一大的內河港，於 12 世紀出現，然 13 世紀時因萊茵河改道，偏離此處大約 1200 英里而逐漸沒落，直至 17 世紀因位處歐洲工業發展重心的魯爾區，且運河技術引進而興起，從萊茵河向東延伸，聯繫起杜伊斯堡內港。其位在魯爾河與萊茵河匯流處（詳圖 5. ），全長約 25 公里，過去貨物吞吐量年平均達 6,000 萬噸，過去為德國工業革命進口許多動力材料與產品，然隨經濟結構的變遷，港口相關產業紛紛遷移倒閉，原熱絡的碼頭、船隻與倉庫也隨之消失，成為一片荒廢且飽受污染的土地。直至 1989 到 1999 年間，北萊茵威斯特法倫州政府將此地納入國際建築展埃姆舍公園計畫的一部分，透過 1991 年的競賽徵選改造構想，決定將文化與休閒空間融入，提供當地住宅、辦公室、輕型工業、水上設施與文化設施等功能，並優先發展基礎公共設施，將港口改建成適宜居住、有工作機會與觀光的地方，吸引民眾進駐，接著將河岸兩側種植植栽與鋪設人行道，以及闢建運河與設計住宅公寓，打造成能觀賞河岸風光的社區花園，逐步將杜伊斯堡內港區轉型與城市融合，同時也成為歐洲重要的工業遺址一部分。

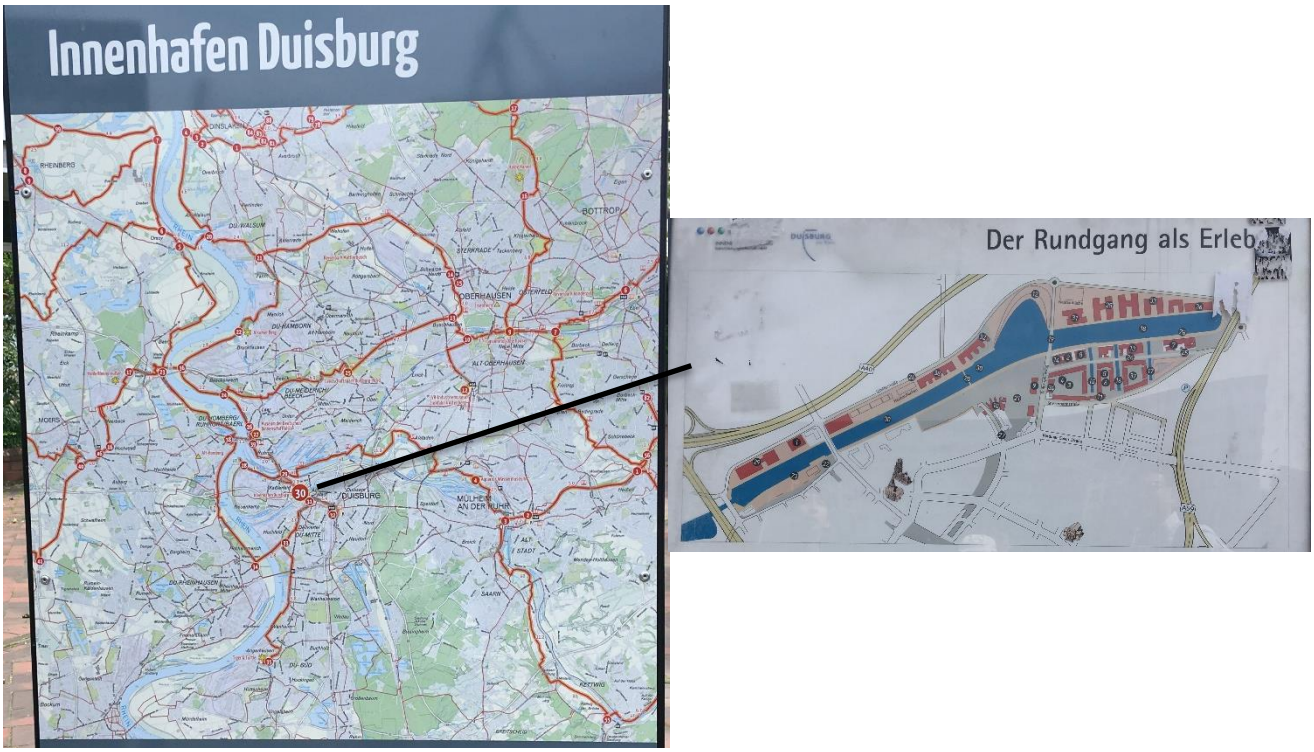


圖 5. 杜伊斯堡內港位置示意圖

現今的杜伊斯堡內港已然改造成繁榮的住商區，河岸兩側有許多的餐廳和咖啡廳，提供遊客享用餐飲之時也可觀賞河岸風光與船隻進出，沿岸為人行步道與自行車道，並架設多個解說牌，介紹各項設施設計的理念與歷史，一旁還有公園、留存中世紀防禦城牆的古蹟以及博物館，詳細記錄杜伊斯堡內港的歷史與發展進程，此外也提供水上活動與觀光導覽的船隻，周邊有多達 700 間融合現代設計的住宅公寓以及商辦大樓，為此地提供 4,000 多個就業機會。場址參訪情形詳圖 6. 所示。

(A) 港口周邊景點介紹

(B) 河岸船隻與商辦大樓

(C) 港口歷史解說牌

(D) 兒童公園

(E) 河岸旁住宅公寓

(F) 歷史博物館

圖 6. 杜伊斯堡內港參訪情形

4. 關稅同盟礦區

關稅同盟礦區（Zeche Zollverein）位於埃森北部（詳圖 7. ），當時為生產鋼鐵因此需要煉焦，而此地擁有豐富的煤礦，因此第一座礦坑於 1847 年誕生，並於 1851 至 1986 年 12 月 23 日期間進行數十年的礦產活動，到 1890 年此地已成為德國產礦量最高的地方。1932 年 XII 豎井啟用，每日可開採多達 12,000 噸的煤礦，在當時提供超過 5,000 名的工作機會，XII 豎井也成為當地代表性的象徵；1959 至 1961 年焦化廠成立，成為當時最現代化的工廠之一，每日可將 10,000 噸的煤生產出 7,500 噸的焦炭，提供鋼鐵業使用。直至 1980 年因煤礦產量驟減，營利不足以支撐工廠的運作，因此在 1983 年魯爾煤礦公司（Ruhrkolegesellschaft, RAG）決定要關閉。關閉後RAG公司原要將此地拆除，然北萊茵威斯特法倫州政府持反對意見，最終在 1989 年決定以資產收購機構（Landesentwicklungsgesellschaft, LEG）向 RAG 公司買下關稅同盟礦區，將 XII 豎井公告為遺址，並與埃森政府共組管理公司（Bauhutte Zeche Zollvererin Schacht XII Gmbh）負責此處的規劃與發展，經過國際建築展十多年的改造，在 1998 年北萊茵威斯特法倫州政府與埃森政府成立了關稅同盟基金會，負責管理此處的營運。在 2001 年煤礦廠及焦化廠，以及 I、II、VIII 豎井與 XII 豎井，被聯合國列為世界遺產之一。整個關稅同盟礦區可分成三個部分，A 區為 XII 豎井、魯爾博物館與紅點設計博物館的位置；B 區為 I、II、VIII 豎井的位置，年代最為久遠，平時不對外開放；C 區則為煉焦廠。

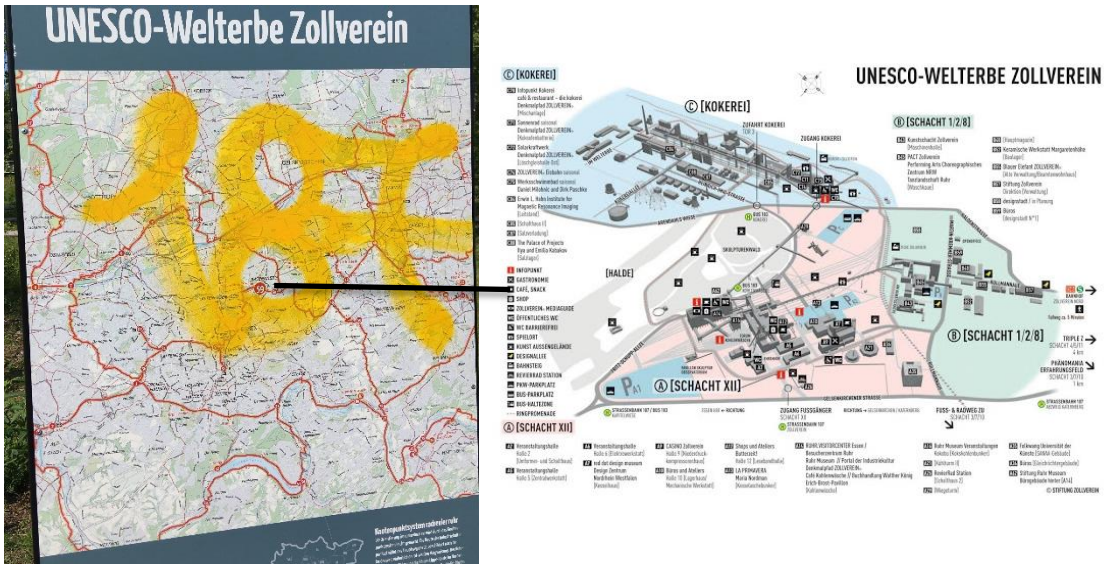


圖 7. 關稅同盟礦區位置示意圖

其中魯爾博物館是從選礦廠改建而成，收藏大量的地質、考古、工業和歷史等文物與影像記錄，充分展現採礦業的辛勞，內部規劃以高度區分（詳圖 8. ），0 m 與最高的 24 m 為主要的展示空間，6 m、12 m 與 17 m 則為三處不同的展覽場地，其中 6 m 處主要為展示歷史文物，17 m 則是以聲光效果展示過往設施的使用，12 m 處則展示常態與不定期特展，另頂樓為 45 m，可一覽關稅同盟礦區景觀。此次的導覽人員為當地居民，主要帶領我們沿著煤炭生產過程參觀選礦廠與 XII 豎井，說明過去礦工辛苦的工作生活，以及介紹礦區的興起與衰敗。起初源自於工業革命需要鋼鐵，隨著煉焦製程與蒸汽引擎的發展，擁有豐富煤礦的魯爾地區隨著礦業發展人口成長了 35 倍，在一次世界大戰後 4 間大型企業成立煤礦公司，調查此處的煤礦存量並計畫開發，直到 1986 年此處的煤礦被開採完。在當時許多居民都在此當礦工，然而生活空間十分擁擠，二十四小時都要待命輪班，居住環境不佳且空氣品質差。此外，也介紹各項煤礦煉焦與生產鋼鐵的製程與設施，以及說明煤炭的生產造成大量的廢礦，而此處可看到的山丘地形大多非自然生成，而是在重新改造這個地方時，將廢棄的堆置物透過適當的處置與覆蓋而生成。當初決定發展成歷史文物保留，希望能讓世人記住過去的歷史，也謹記工業發展對環境的影響以及後續回復所需要花費的成本；然而在決定保存廠區的維護與營運上，面臨經費來源不足的挑戰，因此魯爾博物館設計成可提供展覽、研討會、導覽、講座、電影等活動使用的場地，彌補部分維運所需的經費支出，另外也透過社會大眾與歐盟的贊助，才得以維運這個地區。雖然不如工業生產可獲得巨額的經濟效益，但重要的是透過文化保存與國際認證，成功凝聚當地居民跨時代的情感與對當地的認同，也讓德國魯爾地區以不同的姿態重新躍上國際舞台。場址參訪情形詳圖 9. 所示。

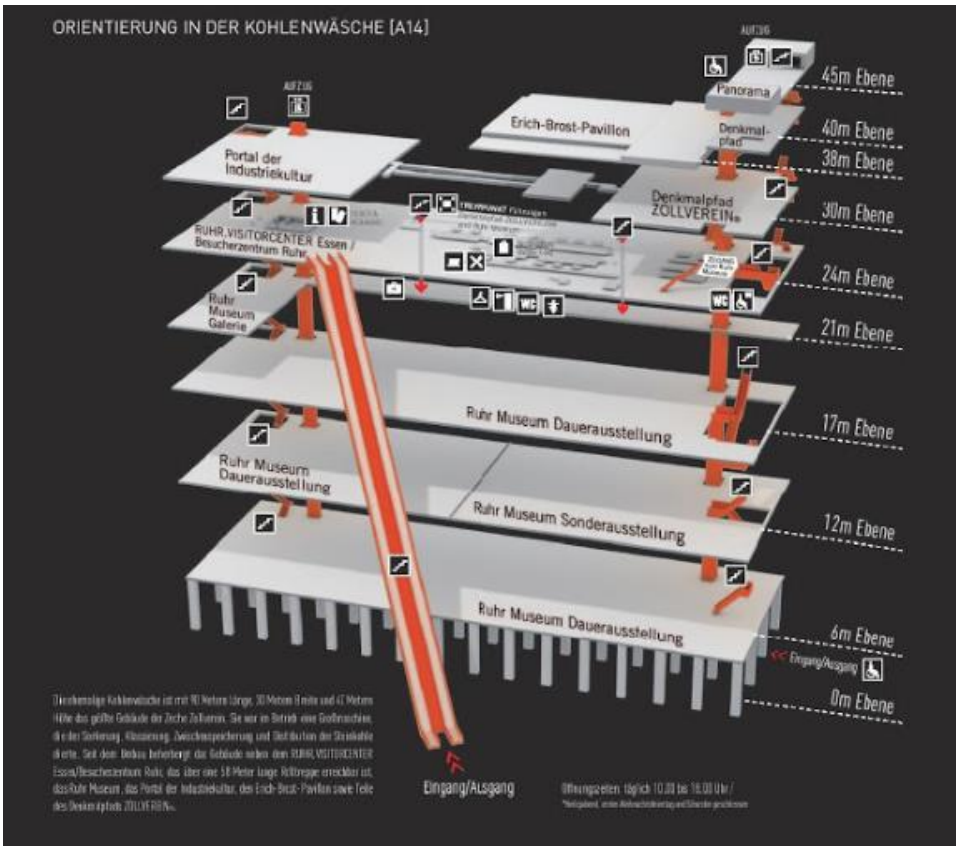


圖 8. 魯爾博物館空間配置圖

(A) 關稅同盟礦區立體展示圖

(B) 煉焦廠

(C) 魯爾博物館

(D) 關稅同盟礦區俯瞰

(E) 導覽過程-工具展示

(F) XII 豎井

圖 9. 關稅同盟礦區參訪情形

五、 心得與建議

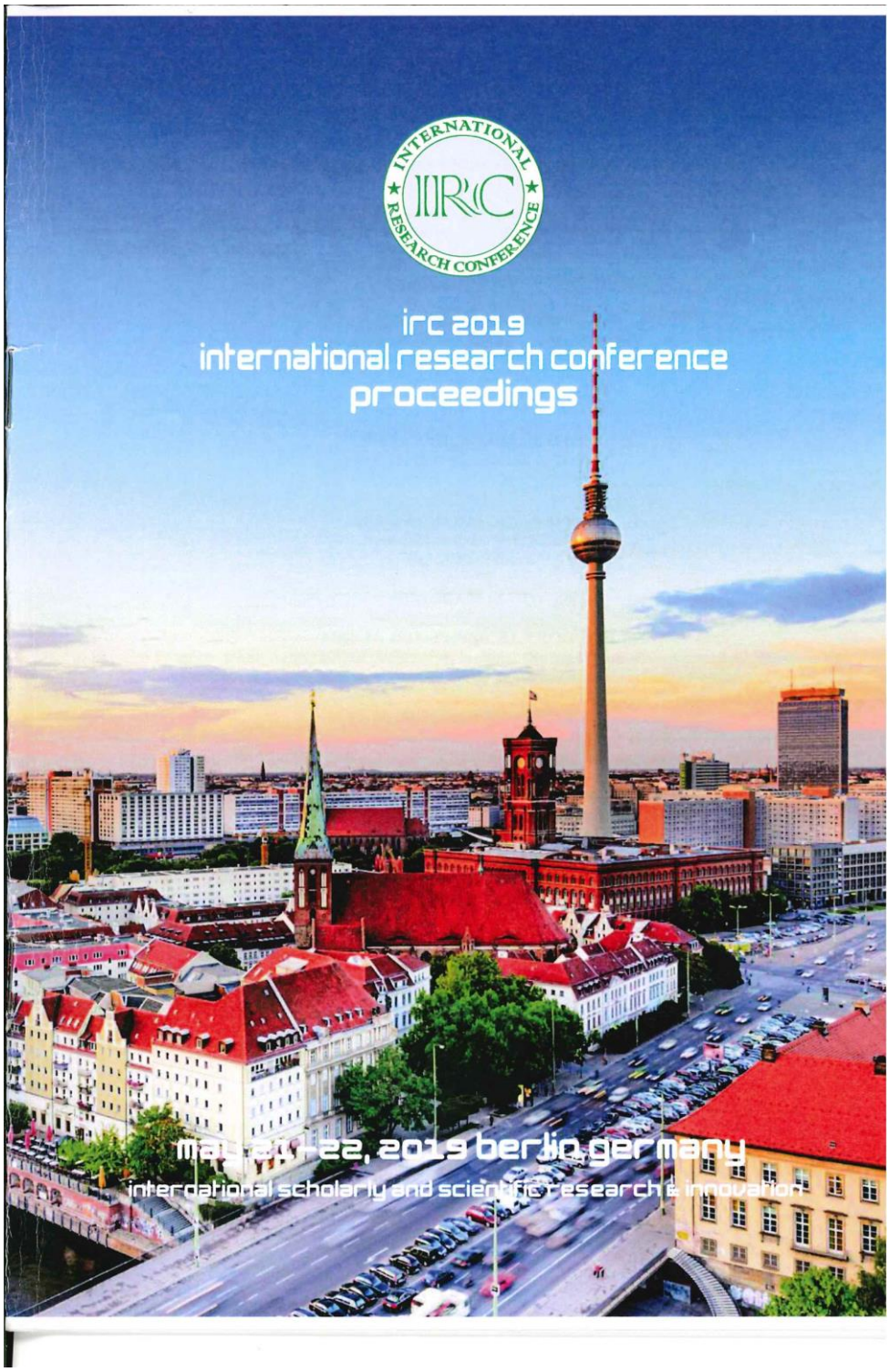
本次國際會議共計發表百餘篇研究成果，涵蓋領域之廣度及深度甚大，同時，透過本署共同投稿之褐地再利用研究成果發表，讓我國相關土壤及下水整治成果能夠有機會更直接進行國際交流。

污染土地再利用之情形於歐美先進國家業已深刻體認這個關鍵議題，因此對於受污染的土地已不再單純的污染整治，而是基於土地的永續利用與價值再造，結合整體土壤與地下水污染問題，透過工程技術、風險管理手段，配合政策與行政措施，逐步恢復污染土地之價值，相關措施對於我國受限於國土面積與人口密度因素，更應積極對於受污染土地思考如何重新找回價值，使國土得以獲得保全，並建立土地的再循環程序。

參照魯爾工業區曾經是德國，也是世界重要的工業區之一，當年以採煤、鋼鐵、化學、機械製造等重工業為核心，形成部門結構複雜、內部聯繫密切、高度集中的地區工業綜合體，伴隨後續再利用成果贏得「歐洲文化首都 2010」獎項，更是首次以「區域」而非單一城市作為獲選單位，魯爾區現今已擁有 100 座音樂廳、200 座博物館、120 家劇院、100 個文化中心、250 個節慶、19 所大學、1,000 個工業紀念碑，象徵著魯爾區告別高度污染煤鋼的舊時代，走向知識社會時代的國際大都會的重要標誌。

承前述，透過：1. 改善維護既有建築物與舊空間再利用，2. 漸進式恢復生態，並防止未開發土地繼續開發，3. 在公園裡創造就業機會，並使居民投入等三大方式，造就原關稅同盟礦區於 2001 年列入世界文化遺產名錄的成功經驗，對於我國過往同以礦業、鋼鐵業時代遺留下之污染場址類型，後續如何成功改善並再造土地價值，均將進一步納入未來法規制度設計內容，提升我國污染土地再利用成效。

附錄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1		Roles of Nurse Manager for Team Nursing in Geriatric Health Service Facilities in Japan	Chiharu Miyata, Hidenori Arai Mie University Japan
2	e-Poster	Eye Problems in Students during Gross Anatomy Laboratory Class at Burapha University, Chonburi, Thailand	Luksanaporn Krungkraipetch Burapha University Thailand

3		Supporting Moral Competence with the Konstanz Method of Dilemma Discussion: Presentation of the Method and It's Possible Applications	Malgorzata Stec Jesuit University of Philosophy and Education Ignatianum Poland
4		Theory of Mind in Students Who Study a Second Language Academically Compered to Controls	Mohammad Taghi Saeidi, Fatemeh Moeini Allameh Tabataba'i University Iran, Islamic Republic Of
5		The Dialectic of Introspection and External Observation: An Autoethnography of Religious Prayer Practices in Israeli Reform Jewish Congregations	Elazar Ben-Iulu Ben-Gurion University Israel

PHYSICAL PROGRAM
MAY 21, 2019
Session II: 09:10-09:50
Coffee Break: 09:50-10:00

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Chair: Maria Lidia Guglielminetti, Carlos Javier Fernández

1		Wood Decay Fungal Strains Useful for Bio-Composite Material Production	C. Girometta, S. Babbini, R. M. Baiguera, D. S. Branciforti, M. Cartabia, D. Dondi, M. Pellegrini, , M. Picco, E. Savino University of Pavia Italy
2		Preliminary Characterization of Hericium Species Sampled in Tuscany, Italy	V. Cesaroni, A. Bernicchia, M. Brusoni, F. Corana, M. Baiguera, C. M. Cusaro, C. Girometta, M. L. Guglielminetti, B. Mannucci, H. Kawagishi, C. Pe A. M. Picco, P. Rossi, E. Salerni, E. Savino University of Pavia Italy
3	e-Poster	Ganoderma lucidum Is Able to Modulate Gene Expression in Human Cells Acting at Epigenetic Level: Preliminary Data	Enrica Capelli, Giuseppe Lupo, Carolina Girometta Elena Savino, Maria Lidia Guglielminetti, Matteo Caruso, Paola Rossi, Anna Maria Picco University of Pavia Italy
4	e-Poster	Orange Leaves and Rice Straw on Methane Emission and Milk Production in Murciano-Granadina Dairy Goat Diet	Tamara Romero, Manuel Romero-Huelva, Jose V. Segarra, Jose Castro, Carlos Fernandez Universitat Politècnica de València Spain

PHYSICAL PROGRAM
MAY 21, 2019
Session III: 10:00-10:50

Chair: Jesús Muñuzurí, Gaurav Sonawane

1		Design of a Technology Transfer Scheme for the Aeronautical Sector in Alentejo-Andalusia	J. Munuzuri, L. Onieva, J. Guadix, P. Cortes University of Seville Spain
2		Sentiment Analysis of Tourist Online Reviews Concerning Lisbon Cultural Patrimony, as a Contribute to the City Attractiveness Evaluation	Joao Ferreira Do Rosario, Maria De Lurdes Calisto, Ana Teresa Machado, Nuno Gustavo, Rui Gonçalves Escola Superior de Comunicação Social, Instituto Politécnico de Lisboa Portugal
3		Studies on the Characterization and Machinability of Duplex Stainless Steel 2205 during Dry Turning	Gaurav D. Sonawane, Vikas G. Sargade Dr. Babasaheb Ambedkar Technological University India
4		Detection of Trends and Break Points in Climatic Indices: The Case of Umbria Region in Italy	A. Flammini, R. Morbidelli, C. Saltalippi University of Perugia Italy
5	e-Poster	Materials Characterization and Hydrogen Storage Capacity of MgNiCeCu Metallic Glasses	Katarina Sulova, Zuzana Molcanova, Milos Fejercak, Tomas Brestovic, Natalia Jasminska, Zdenka Lukacova Bujnakova, Maria Podobova, Jens Moellmer, Marcus Lange, Michaela Sulikova, Stefan Michalik, Karel Saksl Slovak Academy of Sciences Slovakia

PHYSICAL PROGRAM
MAY 21, 2019
Session IV: 10:50-11:40

Chair: Dirk Winkler, Renato Morbidelli

1	e-Poster	A Case Study of Brownfield Revitalization in Taiwan	Jen Wang, Wei-Chia Hsu, Zih-Sin Wang, Ching-Ping Chu, Bo-Shiou Guo Sinotech Engineering Consultants, Inc. Taiwan
2	e-Poster	Technical Sustainable Management: An Instrument to Increase Energy Efficiency in Wastewater Treatment Plants, a Case Study in Jordan	Dirk Winkler, Leon Koevener, Lamees AlHayary GIZ Jordan Jordan
3		Modelling the Effect of Biomass Appropriation for Human Use on Global Biodiversity	Karina Reiter, Stefan Dullinger, Christoph Plutzar, Dietmar Moser University of Vienna Austria
4		On the Mathematical Representation of Slope-Infiltration	Renato Morbidelli, Carla Saltalippi, Alessia Flammini, Jacopo Dari, Corrado Corradini Perugia University Italy
5	e-Poster	Experimental and Theoretical Investigation of Slow Reversible Deformation of Concrete in Surface-Active Media	Nika Botchorishvili, Olgha Giorgishvili Georgian Technical University Georgia

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2	e-Poster	Method Validation and Estimation of Uncertainty for Some Honey Quality Parameters	Elham M. Elsayed, Ibrahim A. Abd El Gawad, Sal N. Salman Faculty of Agriculture, Cairo University Egypt
3		A Review on Tomato Post-Harvest Losses and Mitigation Measures	E. K. Bwade, B. Umar, M. S. Husseini The Federal Polytechnic Mubi Nigeria
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2	e-Poster	Characterization of the Ecological Trail of Serra Do Espírito Santo, Brazil	Glerivan S. Martins, Veruska C. Dutra Federal University of Tocantins Brazil
3	e-Poster	Diagnosis on Environmental Impacts of Tourism at Natural Resort in Lajeado City, Tocantins State, Brazil	Mary L. G. S. Senna, Veruska C. Dutra, Alessandra M. Silva, Lubederu Javaé, Ricardo F. Oliveira Federal Institute of Education, Science and Technology of Tocantins Brazil
4	e-Poster	Analysis of Environmental Impacts Generated in the Seasons of Holidays from Praia Dos Buritis in Palmas, Tocantins, Brazil	Alana C. M. Santana, Mary L. G. S. Senna Federal Institute of Education, Science and Technology of Tocantins Brazil
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2	e-Poster	Examining the Relations among Autobiographical Memory Recall Types, Quality of Descriptions, and Emotional Arousal in Psychotherapy for Depression	Jinny Hong, Jeanne C. Watson University of Toronto Canada

A Case Study of Brownfield Revitalization in Taiwan

Jen Wang, Wei-Chia Hsu, Zih-Sin Wang, Ching-Ping Chu, Bo-Shiou Guo

***Abstract*—**In the late 19th century, the Jinguashi ore deposit in northern Taiwan was discovered, and accompanied with flourishing mining activities. However, tons of contaminants including heavy metals, sulfur dioxide, and total petroleum hydrocarbons (TPH) were released to surroundings and caused environmental problems. Site T was one of copper smelter located on the coastal hill near Jinguashi ore deposit. In over ten years of operation, variety contaminants were emitted that it polluted the surrounding soil and groundwater quality. In order to exhaust fumes produced from smelting process, three stacks were built along the hill behind the factory. The sediment inside the stacks contains high concentration of heavy metals such as arsenic, lead, copper, etc. Moreover, soil around the discarded stacks suffered a serious contamination when deposition leached from the ruptures of stacks. Consequently, Site T (including the factory and its surroundings) was declared as a pollution remediation site that visiting the site and land-use activities on it are forbidden. However, the natural landscape and cultural attractions of Site T are spectacular that it attracts a lot of visitors annually. Moreover, land resources are extremely precious in Taiwan. In addition, Taiwan Environmental Protection Administration (EPA) is actively promoting the contaminated land revitalization policy. Therefore, this study took Site T as case study for brownfield revitalization planning to the limits of activate and remediate the natural resources.

Land-use suitability analysis and risk mapping were applied in this study to make appropriate risk management measures and redevelopment plan for the site. In land-use suitability analysis, surrounding factors into consideration such as environmentally sensitive areas, biological resources, land use, contamination, culture, and landscapes were collected to assess the development of each area; health risk mapping was introduced to show the image of risk assessments results based on the site contamination investigation. According to land-use suitability analysis, the site was divided into four zones: priority area (for high-efficiency development), secondary area (for co-development with priority area), conditional area (for reusing existing building) and limited area (for Eco-tourism and education). According to the investigation, polychlorinated biphenyls (PCB), heavy metals and TPH were considered as target contaminants while oral, inhalation and dermal would be the major exposure pathways in health risk assessment. In accordance with health risk map, the highest risk was found in the southwest and eastern side. Based on the results, the development plan focused on zoning and land use. Site T was recommended be divides to public facility zone, public architectonic art zone, viewing zone, existing building preservation zone, historic building zone, and cultural landscape zone for various purpose. In addition, risk management measures including sustained remediation, extinguish exposure and administration management are applied to ensure particular places are suitable for visiting and protect the visitors' health. The consolidated results are corroborated available by analyzing aspects of law, land acquired method, maintenance and management and public participation. Therefore, this study has a certain reference value to promote the contaminated land revitalization policy in Taiwan.

***Keywords*—**Brownfield revitalization, land-use suitability analysis, health risk map, risk management.

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A Longitudinal Examination of the Impact of Treatment Modality on Relationship Satisfaction and Mental Health Quality of Life Outcomes among Prostate Cancer Survivors

Gabriela Ilie, Robert D. H. Rutledge

Abstract—A review of the literature reveals a need for longitudinal studies to properly understand the quality of life of prostate cancer survivors during their prostate cancer journey in order to identify opportunities for patient support and care during prostate cancer survivorship. In this study, mental health and relationship satisfaction were assessed longitudinally and by treatment modality among a population-based sample of Canadian adult men with a history of prostate cancer diagnosis. A total of 98 men, aged 51 or older with a history of prostate cancer completed an on-line 15-minute survey between May 2017 and February 2018, assessing mental health (Kessler Psychological Distress Scale) and relationship satisfaction (Dyadic Adjustment Scale) at baseline and at three months post-treatment with either active or nonactive prostate cancer treatment. Almost 1 in 6 men in this sample screened positive for mental health issues (17.34%, n=17) irrespective of treatment modality and most (n=11) were not currently on medication for depression, anxiety or both. Mental health outcomes were poorer for men with multimorbidity. For every instance of screening positive for mental health issues, 2.021 (95% CI:1.1 to 3.8) times more comorbidities were recorded. Relationship satisfaction and dyadic cohesion were statistically significantly lower from first assessment to 3 months for men who underwent multiple treatment modalities (surgery and radiation with hormonal therapy). Relationship satisfaction was also lower at 3 months for men who underwent radiation therapy. Almost 1 in 2 men in this sample (74%) indicated they did not attend a prostate cancer support group. Results suggest that treatment for mental health is underutilized in men with prostate cancer. Men who undergo multiple forms of active treatment appear more vulnerable to relationship dissatisfaction and feeling disconnected from their partner. Data points to important opportunities for patient education and care support during survivorship.

Keywords—prostate cancer survivorship, mental health, quality of life, relationship satisfaction

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A Review on Tomato Post-Harvest Losses and Mitigation Measures

E. K. Bwade, B. Umar, M. S. Husseini

Abstract—Tomato is the most highly produced and consumed fruit/vegetable in Nigeria; with annual production estimates of over 162 million tons due to which Nigeria was ranked second largest producer of tomatoes in Africa. Tomato, being a fruity vegetable, has large quantity of moisture at harvest; thus, it continues to undergo physiological processes (i.e., respiration, ripening and senescence) even after harvest; making it highly vulnerable to deterioration. Postharvest losses account for between 30 and 50% of the tomatoes produced in Nigeria. This paper discusses the various factors/agents responsible for the higher percentages of postharvest losses in tomatoes, and proffers solutions. Poor cultural, harvesting and handling practices, coupled with wrong choice of packaging materials, the absence of cold storage facilities, inadequately maintained roads and the use of vehicles with inappropriate suspension systems were revealed as the major contributors of postharvest losses in tomatoes. It was also revealed that considerable percentage of postharvest losses can be prevented by applying pre- and postharvest mitigation measures; firstly, by cultivating improved cultivars of tomato, and by not applying too much nitrogen fertilizers during cultivation; due to its detrimental effects on shelf life of tomato. Secondly, shelf life can be extended by carefully harvesting tomato at mature green maturity stage and ensuring that the crop is harvested at early morning hours before the ambient temperature reaches 24°C. Dipping tomato fruits in calcium chloride, $CaCl_2$ followed by storing it in refrigerator, evaporative cooler; or passively modified atmosphere with proper temperature management yield promising results; in addition, proper choice of packaging materials and use of vehicles with proper suspension systems will minimize mechanical injury, thus, extending the shelf life of tomatoes.

Keywords—bruise injury, physiological processes, shelf life, tomato

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Adaptive Fluorescence Pixels Control in Visibility Refinement through Cuckoo Search Algorithm

Sangita Roy, Sheli Sinha Chaudhuri

Abstract—Visibility Impairment is a key problem of concern in image processing and analysis. Brightest pixels , specially sky region in daytime, make few parts of image full of glare / fluorescence/ dazzling and add-ing artifact and unusable for computer-vision. In dehazing with physics based optical model, masking high intensity pixels in each channels (RGB and gray) can reduce this artifact. But, manual control of searching exact pixel values is time consuming and requires human intervention. This paper presents an efficient and simple method of optimising fluorescence pixel intensity value by using CSA(Cuckoo Search Algorithm) with image quality and quantifying analysis through PSNR, CNR parameters. Ob-jective function PSNR is optimised by tuning fluorescence pixels using levy steps of CSA. CSA is used for faster convergence among other contemporary meta-heuristic optimisations.

Keywords—dehaze, CS, metaheuristic, dark channel prior, levy flight, visibility improvement, PSNR, CNR

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Analysis of a Multi-Delayed SEIR Epidemic Model with Immunity Period and Treatment Function in Deterministic and Stochastic Environment

Soumen Kundu, Debaldev Jana, Sarit Maitra

Abstract—In this paper a multi-delayed epidemic SEIR model with immunity period and treatment function has been considered in deterministic and stochastic environment. The delays are taken as immunity period delay and treatment delay. Firstly, in deterministic situation, a feasible region has been obtained in parametric space, where the solutions of the system is bounded and positive. The conditions for stability of both endemic and epidemic equilibrium have been derived. Later, in presence of stochasticity the dynamics for the SEIR model has been discussed in both presence and absence of delays.

Keywords—SEIR model , Delays, Saturated treatment function, Lyapunov functional, Fourier transformation

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Analysis of the Consistency in the Geometric Design of the Road That Lead from the Ye to El Viajano in the department of Cordoba

Duvan Ramos, Jesus Ramos, Ruben Volcanes

Abstract—In the last 30 years a great advance and evolution has been seen in the corresponding to the philosophy of the design, this due to approaches such as consistency in the design, forgiving desing and sensitive design to the context, these have allowed to expand the cinematic-mechanistic vision of the design incorporating aspects of user costs, driver behavior, road safety and social and environmental impact The consistency approach in the geometric design allows to include the behavior of the driver through the study of the speed of operation and acceleration of operation, visibility available and provided under the probabilistic concept of risk; This approach seeks to achieve maximum conformity between the geometric characteristics of the road and the resulting operational, and the expectations of the driver as it travels. Consistency is one of the ways to measure the proper functioning and level of safety associated with the geometric design of a road. And exploratory study will be presented below, in which the degree of consistency of the road that leads from the municipality of La Ye to the municipality of Viajano in the department of Córdoba Colombia is verified, this degree of consistency will be obtained by applying the method of Lamm and the Polus method, which take into account the geometrical design and speed of operation of the road, these will be measured by means of drones. The purpose of this research is to determine indexes that help improve future road designs and reduce accident rates

Keywords—Lamm method, Polus method, drone, road safety, speed of operation, design speed, field measurements

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Analysis of the Role of Population Ageing on Crosstown Roads' Traffic Accidents Using Latent Class Clustering

N. Casado-Sanz, B. Guirao

Abstract—The population aged 65 and over is projected to double in the coming decades. Due to this increase, driver population is expected to grow and in the near future, all countries will be faced with population aging of varying intensity and in unique time frames. This is the greatest challenge facing industrialized nations and due to this fact, the study of the relationships of dependency between population aging and road safety is becoming increasingly relevant. Although the deterioration of driving skills in the elderly has been analyzed in depth, to our knowledge few research studies have focused on the road infrastructure and the mobility of this particular group of users. In Spain, crosstown roads have one of the highest fatality rates. These rural routes have a higher percentage of elderly people who are more dependent on driving due to the absence or limitations of urban public transportation. Analysing road safety in these routes is very complex because of the variety of the features, the dispersion of the data and the complete lack of related literature. The objective of this paper is to identify key factors that cause traffic accidents. The individuals under study were the accidents with killed or seriously injured in Spanish crosstown roads during the period 2006-2015. Latent cluster analysis was applied as a preliminary tool for segmentation of accidents, considering population aging as the main input among other socioeconomic indicators. Subsequently, a linear regression analysis was carried out to estimate the degree of dependence between the accident rate and the variables that define each group. The results show that segmenting the data is very interesting and provides further information. Additionally, the results revealed the clear influence of the aging variable in the clusters obtained. Other variables related to infrastructure and mobility levels, such as the crosstown roads layout and the traffic intensity aimed to be one of the key factors in the causality of road accidents.

Keywords—cluster analysis, population ageing, rural roads, road safety

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Application of Lean Manufacturing Tools in Hot Asphalt Production

S. Bayona, J. Nunez, D. Paez, C. Diaz

Abstract—The application of Lean manufacturing tools continues to be an effective solution for increasing productivity, reducing costs and eliminating waste in the manufacture of goods and services. This article analyzes the production process of a hot asphalt manufacturing company from an administrative and technical perspective. Three main phases were analyzed, the first phase was related to the determination of the risk priority number of the main operations in asphalt mix production process by an FMEA (Failure Mode Effects Analysis), in the second phase the Value Stream Mapping (VSM) of the production line was performed and in the third phase a SWOT (Strengths, Weaknesses Opportunities, Threats) matrix was constructed. Among the most valued failure modes were the lack training of workers in occupational safety and health issues, the lack of signaling and classification of granulated material, and the overweight of vehicles loaded. The analysis of the results in the three phases agree on the importance of training operational workers, improve communication with external actors in order to minimize delays in material orders and strengthen control suppliers.

Keywords—asphalt, lean manufacturing, productivity, process

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Area Approach Development for Economic and Social Equity in Mountainous Regions of Thailand

Khodchaporn Sukchitpinyo, Kesaraporn Sreechun, Natthawan Thamsuwan, Pedcharada Yusuk

Abstract—The highland in Thailand refers to the North mountainous complex located at 500-1,400 meters above sea level covering 10.75 ha in 20 provinces, 53% of total area of the nation. Mountains are origins of major water a resource serving the nation and more than 10 ethnic groups with total population of 940,494 people has lived upstream for several decades. The mountain people is the poorest defined by both cash income (972 U$/household/year) and food accessibility. Income disparities have been derived by spatial, social and resources access inequity. Located in highly remote area discourages public service access including low literacy. Harsh conditions of sloping complex and climatic conditions in mountain drops off agricultural productivity. Lately, proclamation of protected areas in upstream watershed has limited size and rights of farmland. The terminology 'hill tribe' means not only ethnic groups who live in the mountains but stigma of poor and least developed people. In 2005, the Royal Thai government established Highland Research and Development Institute (HRDI), a public funded organization, to catalyst sustainable mountain development with twofold programs of development-oriented and extension services. The HRDI operation has been based on area approach transdisciplinary development that includes agricultural production under food safety practices, farmer group formation and conservation of upstream resources through two phases of 17 and 29 field offices. Also, HRDI has pledged for cooperation from line agencies on infrastructure and knowledge supports. The first decade of HRDI operation has favourably resulted pilot farmers improved livelihood in 396 target villages targets. The HRDI's economic survey of farmer household reveals improving average income mainly from agricultural production of 3,418 U$/household/year in 2010 and 6,236 U$/household/year in 2014 whereas only 17.33% remains in food insecurity. Hill tribe farmers are seen as safe food producer especially temperate crops that are applicable in mountains where mountains landscape gradually attracts eco-tourism. The betterment of people in mountains mostly infers by area approach development that embraces inclusiveness of farmers, landscape and culture in mountains. The field offices in target villages are facilitators for knowledge transfer on agriculture productivity that are responding to each agro-ecological zone, cooperation with local agencies and mentor for community initiatives. Improved road transportation, telecommunication access, power supply, and water storage system were possibly set in place by continued supports of relevant ministries. Above all, the government policy has put high priority on inclusive growth for least developed and marginalized groups. Despite of favourable outcomes, income equity in mountains has been in challenges. The average household income of 8,384 U$/household/year remains in the 40% (bottom 40) of poorest groups of total population who earn 8,416 U$/household/year. Also, self-reliance community that is not limited only on agriculture sector will be the next priority agenda.

Keywords—income equity, inclusive growth, area approach, mountains

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Assessment of Growth Variation and Phytoextraction Potential of Four *Salix* Varieties Grown in Zn Contaminated Soil Amended with Lime and Wood Ash

Mir Md Abdus Salam, Muhammad Mohsin, Pertti Pulkkinen, Paavo Pelkonen, Ari Pappinen

***Abstract*—**Soils contaminated with metals e.g., copper (Cu), zinc (Zn) and nickel (Ni) are one of the main global environmental problems. Zn is an important element for plant growth but excess levels may become a threat to plant survival. Soils polluted with metals may also pose risks and hazards to human health. Afforestation based on short rotation *Salix* crops may be a good solution for the reduction of metals toxicity levels in the soil and in ecosystem restoration of severely polluted sites. In a greenhouse experiment, plant growth and zinc (Zn) uptake by four *Salix* cultivars grown in Zn contaminated soils collected from a mining area in Finland were tested to assess their suitability for phytoextraction. The sequential extraction technique and inductively coupled plasma–mass spectrometry (ICP–MS) were used to determine the extractable metals and evaluate the fraction of metals in the soil that could be potentially available for plant uptake. The cultivars displayed resistance to heavily polluted soils throughout the whole experiment. After uptake, the total mean Zn concentrations ranged from 776 to 1823 mg kg^{-1}. The average uptake percentage of Zn across all cultivars and treatments ranged from 97 to 223 %. Lime and wood ash addition showed a significant effect on plant dry biomass growth and metal uptake percentage of Zn in most of the cultivars. The results revealed that *Salix* cultivars have the potential to accumulate and take up significant amounts of Zn. Ecological restoration of polluted soils could be environmentally favorable in conjunction with economically profitable practices, such as forestry and bioenergy production. As such, the utilization of *Salix* for phytoextraction and bioenergy purposes is of considerable interest.

***Keywords*—**Lime, Phytoextraction, *Salix*, Wood ash, Zinc.

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Asymptotic Modeling the Aerodynamic Coefficients of the NACA Airfoil

M. Hasnaoui, A. Naamane

***Abstract*—**In this study, we are interested in the asymptotic modeling of the two-dimensional stationary flow of a viscous incompressible fluid around wing airfoil. The aim of the present paper is to use the method of matched asymptotic expansions to study the laminar boundary layer behavior over a NACA (National Aeronautic and Space Administration) airfoil. At large Reynolds number and using singular perturbations methods, we distinguish the problems inside and outside the boundary layer. These problems are coupled under asymptotic constraints according to the *least degeneration* principle. Using the *affinity* hypothesis for the velocity field in the boundary layer, and assuming that the transverse velocity is of order $\square(Re^{-1/2})$, we establish an approached composite solution. According to our model, the drag and lift coefficients depend on the parameter (b/A), which characterizes the interaction between the boundary layer and the incidence angle, requires experimental data or numerical simulations. Two methods for estimating the lift and drag curves for an angle of attack $0°\leq\alpha\leq20$ ° with approximation functions were postulated and analyzed in the present work. The first method assumes a quasi-linear approach requiring a single experimental or numerical data. The second method involves a trigonometric approach requiring at least three experimental or numerical data. The results obtained show that accurate modeling is possible for laminar incompressible flow. The predicted solutions obtained compare well with the results of a NACA43013 airfoil produced by the ANSYS (Analysis System) Fluent code.

***Keywords*—**Asymptotic Modeling, Laminar Boundary Layer, Matched Asymptotic Method, Singular Perturbations.

I. INTRODUCTION

IN the vicinity of the wall develops a boundary layer whose viscosity effects are more important. In some circumstances, this layer can be detached from the wall, which is the boundary layer separation phenomenon. For large angles of incidence, the boundary layer on the profile is detached, and consequently the aerodynamic performance is strongly attenuated. A recent study shows that the stall phenomenon is favored by non-linear perturbations in the boundary layer of a wing [1].

Also, the camber, the shape of the mean camber line, and to a lesser extent, the thickness distribution of the airfoil essentially controls the lift and drag characteristics of the airfoil [2].

In the laminar case, separation bubble may cause negative effects, such as decreasing on lift, increasing on drag, reducing stability of the aircraft, vibration, and noise [3].

The effect of dynamic stall on the evolution of forces on the airfoil has been extensively studied by many researchers and universities, and the general features of aerodynamic characteristics have been investigated. In most previous studies, the effects of stall phenomenon on airfoils characteristics aerodynamic have been widely described with many analytical methods. Some of the most successful methods are the vortex models [4]-[7].

The lift and drag coefficients (CL and Cd) are closely related to the pressure distribution and the friction constraints around the profile, thus an underestimation of the latter induces errors [8],[9].

This paper presents an attempt to approximate airfoil aerodynamic coefficients in the whole α range with an asymptotic model and as limited amount of data points necessary to tune the model as possible. Those data points were obtained from the simulation of a NACA43013 airfoil by the 2D Computational Fluid Dynamics (CFD).

II. ROBLEM FORMULATION

In this section, we present the asymptotic modeling of the two-dimensional laminar and stationary flow of a viscous incompressible fluid around wing airfoil with an incidence angle α (Fig.1). The gravity force is neglected. The motion is governed by the Navier-Stokes and the continuity equations.

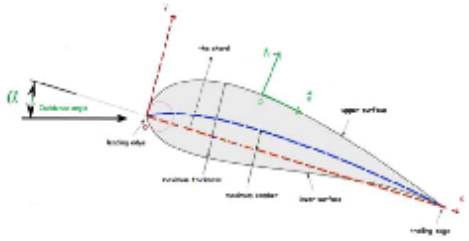

Fig1. Diagram of the airfoil of the problem

It is convenient to choose the system of curvilinear coordinates (s,η). In "fig.1", $\vec{e}$ and $\vec{n}$ are, respectively, the unit tangential and normal vectors.

The first step in a ***perturbation analysis*** is to identify the perturbation quantity. This is done by expressing the exact mathematical model in dimensionless form assessing the order of magnitude of different terms, and identifying the term that is small compared to others. At this level, we introduce scaled variables, namely:

$$\begin{cases} \bar{s}=\dfrac{s}{c}\ ;\bar{\eta}=\dfrac{\eta}{c}\ ;\bar{p}=\dfrac{p}{\rho_0 U_0^2} \\ \bar{u}=\dfrac{u}{U_0}\ ;\bar{w}=\dfrac{w}{U_0}\ ;\bar{\rho}=\dfrac{\rho}{\rho_0}=o(1)\equiv 1 \end{cases} \quad (1)$$

Where $u(s,\eta)$, $w(s,\eta)$ and $p(s,\eta)$ are, respectively, the tangential and normal velocities and the pressure. For the

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Building up Regional Innovation Systems (RIS) for development: The case study of the State of Mexico, México

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Abstract—The State of Mexico is an administrative entity of Mexico, and it is one of the most important territories due to its great economic and social impact for the whole country, especially since it contributes with more than eight of the national Gross Domestic Product (GDP). The State of Mexico has a population of over seventeen million people and host very important business and productive industries such as Automotive, Chemicals, Pharmaceutical, and Agri-food. In 2017, the State Development Plan (Plan Estatal de Desarrollo in Spanish) which is a policy document that rules State's economic actions and integrates the bases for sectoral and regional programs to achieve regional development), raised innovation as a key aspect to boost competitiveness and productivity of the State of Mexico. Therefore, in line with this proposal, in 2018 the Mexican Council for Science and Technology (COMECYT for its acronym in Spanish), an institution in charge of promoting public science and technology policies in the State of Mexico, took actions towards building up the State´s Innovation System. Hence, the main objective of this paper is to review and analyze the process to create RIS in the State of Mexico. We focus on the key elements of the process, the diverse actors that were involved in it, the activities that were carried out and the identification of the challenges, findings, successes, and failures of the intended exercise. The methodology used to analyze the structure of the Innovation System of the State of Mexico is based on two elements: the case study and the research-action approach. The main objective of the paper, the case study was based on semi-structured interviews with key actors who have participated in the process of launching the RIS of the State of Mexico. Additionally, we analyzed the information reports and other documents that were elaborated during the process of shaping the State's innovation system. Finally, the results obtained in the process were also examined. The relevance of this investigation fundamentally rests in two elements: 1) keeping documental record of the process of building a RIS in Mexico; and 2) carrying out the analysis of this case study recognizing the importance of knowledge extraction and dissemination, so that lessons on this matter may be useful for similar experiences in the future. We conclude that in Mexico, documentation and analysis efforts related to the formation of RIS and interaction processes between innovation ecosystem actors are scarce, so documents like are of great importance, especially since it generates a series of findings and recommendations for the building of RIS.

Keywords—regional innovation systems, innovation, development, competitiveness

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Cavitation Abrasion Behavior on Rotating Blades with Various Metals and Its Consequences

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***Abstract*—**In this study empirically, cavitation wear on models of various types of metal) gray-plated alloy, aluminum and stainless steel (, at specific spin rotation at a dimensionless number in the same velocity and the same temperature was evaluated in a closed cavitation tunnel. The rate of weight loss, the number of cavities and the way of corrosion with optical microscopes and SEM and the effect of cavitation effects on different metal models were evaluated. The results indicate that the diameter of the cavities due to cavitation is independent of the blade rotational revolution and with the increase in the revolution of models, the number of cavities and the abrasion of the cavitation increases. In this study, it was found that the stainless steel blade has a higher resistance to cavitation wear and correlation are presented in terms of weight reduction rate relative to the revolution.

***Keywords*—**Cavitation, Saturated vapor pressure, Weight Loss Rate, Cavitation Dimensionless number, Abrasion

I. Introduction

Changes in pressure and fluid flow cause cavitation due to the geometric shape of the system. The flowing fluid in the direction of its movement locally has different velocities. These variations of speed cause pressure variations of the fluid, which, due to the increasing superficial velocity , the fluid pressure become less than the critical pressure causing the formation of a bubble in the liquid. This bubble does not eliminate for some reason, even with a bit more pressure than the critical pressure. This mode is called hydrodynamic cavitation. Generally, in this type of cavitation, the pressure of the threshold point is different from the pressure at which the cavitation is visible. The formation and collapse of the bubble are shown in figure 1.

Yield stress	Tensile strength	Metal Types
7600	12250	Aluminum 1100
40000	43300	Aluminum 6061
***	50	Gray Cast iron
100000	125000	Chrome colored stainless steel

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Cavitation causes compressive shock and abrasion, surface corrosion, vibration and noise and the use of liquid abrasion mechanisms. Pressure waves during the explosion of bubbles in contact with solid surfaces cause damage to the solid surface and corrosion at the surface of the vibration and noise. Damaged surfaces can be parts of tubes or turbo cars (pumps, turbines, and propellers).Various studies of surface damage have been done by cavitation. In this study, the effect of abrasion of cavitation on rotary models of gray cast iron

metals and aluminum 1100 and 6061 and stainless steel cast iron is investigated. The specifications for the metals used are given in the table.

Theory

II. DYNAMIC BEHAVIOR OF BUBBLES AND CAVITATION NUCLEI

If we consider the spherical bubble in radius of R_0 the static pressure difference inside and outside is given according to the following equation.

$$\Delta P = Pin - Pout = \frac{2\sigma 0}{R0} \quad (1)$$

In the above relation, σ_0 surface tensions and P_{in} and P_{out} are the arrangement of internal and external pressure bubbles. If in this core the pressure inside the core reaches the vapor pressure of the environment. Then the core water evaporates and penetrates into the nucleus, and thus the nucleus grows and the bubble forms.it means:

$$P_{sat} \geq P_{in} = P_{out} + \Delta P \quad (2)$$

Therefore, when P_{out} is less than the difference in steam pressure and ΔP, there will be a critical pressure P_c to start cavitation:

$$Pc \approx Psat - \frac{2\sigma}{R} \quad (3)$$

R is largest radius of the core and P_{sat} is the vapor pressure of saturated with water. According to the above relations, it is observed that the stability of the bubble grown depends on the bubble radius and the pressure difference. Now, if this bubble suddenly enters a high pressure environment, its walls will not tolerate it and the bubble will collapse.

III. EFFECTIV PARAMETERS IN CAVITATION ABRASION

Various studies have shown that damage to cavitation is due to a variety of factors. The existence of an agent alone is not enough to produce it. So that a combination of geometric and hydrodynamic factors and other related factors are

Characterization of Minerals, Elicitors in Spent Mushroom Substrate Extract and Effects on Growth, Yield and the Management Cassava Mosaic Diseases

S. E. Okere, A. E. Ataga

Abstract—The Background: This paper evaluated the mineral compositions, disease resistance elicitors in Pleurotus ostratus (POWESMS) and Pleurotus tuber-regium water extract spent mushroom substrate (PTWESMS) on the growth, yield and management of cassava mosaic disease. Materials and Methods: The cassava plantlet (tms 98/0505) were generated through meristem tip culture at the Tissue Culture Laboratory, National Root Crop Research Institute, Umudike before they were transfered to the screen house University of Port Harcourt Research Farm. The treatments for this investigation comprised cassava plants treated with POWESMS, PTWESMS and untreated cassava as control which were inoculated with viral inoculum seven days after treatment application. The experiment was laid out in a completely randomized block design with 3 replicates. The data generated were subjected to analysis of variance (ANOVA). Means were separated using Fishers Least Significant Difference at P=0.05. Results: The results obtained revealed that POWESMS contained 19.3, 0.52 and 0.1g/200g substrate of carbohydrate polymers, glycoproteins and lipid molecules elicitors respectively while it also contained 3.17, 212.1, 17.9,21.8, 58.8 and 111.0 mg/100g substrate for N, P, K, Na, Mg and Ca respectively. Further PTWESMS contain 1.6, 0.04 and 0.2g/200g of the substrate as carbohydrate polymers, glycoprotein and lipid respectively; the minerals contained in this substrate were 3.4, 204.8, 8.9, 24.2, 32.2 and 105.5mg respectively for N, P, K, Na, and Ca. There were also significant differences in the mean values of number of storage roots, root lenght, fresh root weight, fresh weight plant biomas, root girth and whole plant dry biomas but no significant difference was recorded for harvest index. The result also revealed significant differences in mean values of disease severity index evaluated at 4, 8, 12, 16, 20, 24 and 28 weeks after innoculation (WAI). Conclusion: The aqueous extract of these spent mushrooms substrate have shown outstanding prospect in managing cassava mosaic disease and also improvement in growth and yield of cassava when compared with the control. However, more work is recommended especially in understanding the mechanism of this induced resistance.

Keywords—characterization, elicitors, mushroom, extract, mosaic

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Condensation Heat Transfer and Pressure Drop of R-134a Flowing inside Dimpled Tubes

Kanit Aroonrat, Somchai Wongwises

Abstract—A heat exchanger is one of the vital parts in a wide variety of applications. The tube with surface modification is generally referred to as an enhanced tube. With this, the thermal performance of the heat exchanger is improved. A dimpled tube is one of many kinds of enhanced tube. The heat transfer and pressure drop of two-phase flow inside dimpled tubes have received little attention in the literature, despite of having an important role in the development of refrigeration and air conditioning systems. As a result, the main aim of this study is to investigate the condensation heat transfer and pressure drop of refrigerant-134a flowing inside dimpled tubes. The test section is a counter-flow double-tube heat exchanger, which the refrigerant flows in the inner tube and water flows in the annulus. The inner tubes are one smooth tube and three dimpled tubes with different helical pitches. All test tubes are made from copper with an inside diameter of 8.1 mm and length of 1500 mm. The experiments are conducted over mass fluxes ranging from 300 to 500 kg/m²s, heat flux ranging from 10 to 20 kW/m², and condensing temperature ranging from 40 to 50 °C. The results show that all dimpled tubes provide higher heat transfer coefficient and frictional pressure drop compared to the smooth tube. In addition, the heat transfer coefficient and frictional pressure drop increase with decreasing of helical pitch. It can be observed that the dimpled tube with lowest helical pitch yields the heat transfer enhancement in the range of 60-89% with the frictional pressure drop increase of 289-674% in comparison to the smooth tube.

Keywords—condensation, dimpled tube, heat transfer, pressure drop

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Conserving Biodiversity through Traditional Practices: A Qualitative and Quantitative Assessment of Central Indian Scared Groves

D. Raha, M. L. Khan

Abstract—Sacred groves are tracts of virgin forest with rich diversity, which have been protected by the local people for centuries for their cultural and religious beliefs and taboos that the deities reside in them and protect the villagers from different calamities. The sacredness, religious beliefs and taboos play a significant role in promoting sustainable utilization and conservation of flora and fauna of the region. That is why sacred grove is an excellent example of traditional conservation methods. The present study has been carried out in 30 selected sacred groves in Chhindwara district, Madhya Pradesh, India. According to the census 2011, Madhya Pradesh is the home of the largest tribal population of India. The state also have the largest forest cover in this country (77, 462 km²). The study revealed that the studied sacred groves are ranged from 0.1 to 22 ha, and in most cases, area occupied by the vegetation was more than 75 per cent of the grove. Most of the sacred groves were situated at the proximity of a water body (river, streams, ponds, etc.). Mainly 3 major forest types namely Dry Deciduous Teak Forest, Peninsular Sal Forest and semi evergreen forest were found among 20 sacred groves. A total of 72 tree species, 62 herb species, 12 lianas and 18 shrub species has been recorded from these sacred groves. The above ground and the belowground biomass have also been calculated. The aboveground biomass of the sacred groves ranges from 61.17 to 98.24 t/ha, which is significantly higher than the Aboveground biomass of the general forests, ranges from 42.66 to 76.24 t/ha. The present study reflects the current scenario of the sacred grove in Central Indian forests. Sadly these groves are under threat of anthropogenic pressure and are degrading rapidly. If proper conservation policy for these sacred groves not taken at the earliest, we will lose our valuable biodiversity as well as our very own traditional culture.

Keywords—aboveground biomass, biodiversity conservation, sacred grove, traditional practice

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Design of a Human-in-the-Loop Aircraft Taxiing Optimisation System Using Autonomous Tow Trucks

Stefano Zaninotto, Geoffrey Farrugia, Johan Debattista, Jason Gauci

Abstract—The need to reduce fuel and noise during taxi operations in the airports with a scenario of constantly increasing air traffic has resulted in an effort by the aerospace industry to move towards electric taxiing. In fact, this is one of the problems that is currently being addressed by SESAR JU and two main solutions are being proposed. With the first solution, electric motors are installed in the main (or nose) landing gear of the aircraft. With the second solution, manned or unmanned electric tow trucks are used to tow aircraft from the gate to the runway (or vice-versa). The presence of the tow trucks results in an increase in vehicle traffic inside the airport. Therefore, it is important to design the system in a way that the workload of Air Traffic Control (ATC) is not increased and the system assists ATC in managing all ground operations. The aim of this work is to develop an electric taxiing system, based on the use of autonomous tow trucks, which optimizes aircraft ground operations while keeping ATC in the loop. This system will consist of two components: an optimization tool and a Graphical User Interface (GUI). The optimization tool will be responsible for determining the optimal path for arriving and departing aircraft; allocating a tow truck to each taxiing aircraft; detecting conflicts between aircraft and/or tow trucks; and proposing solutions to resolve any conflicts. There are two main optimization strategies proposed in the literature. With centralized optimization, a central authority coordinates and makes the decision for all ground movements, in order to find a global optimum. With the second strategy, called decentralized optimization or multi-agent system, the decision authority is distributed among several agents. These agents could be the aircraft, the tow trucks, and taxiway or runway intersections. This approach finds local optima; however, it scales better with the number of ground movements and is more robust to external disturbances (such as taxi delays or unscheduled events). The strategy proposed in this work is a hybrid system combining aspects of these two approaches. The GUI will provide information on the movement and status of each aircraft and tow truck, and alert ATC about any impending conflicts. It will also enable ATC to give taxi clearances and to modify the routes proposed by the system. The complete system will be tested via computer simulation of various taxi scenarios at multiple airports, including Malta International Airport, a major international airport, and a fictitious airport. These tests will involve actual Air Traffic Controllers in order to evaluate the GUI and assess the impact of the system on ATC workload and situation awareness. It is expected that the proposed system will increase the efficiency of taxi operations while reducing their environmental impact. Furthermore, it is envisaged that the system will facilitate various controller tasks and improve ATC situation awareness.

Keywords—air traffic control, electric taxiing, autonomous tow trucks, graphical user interface, ground operations, multi-agent, route optimization

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Design of a Technology Transfer Scheme for the Aeronautical Sector in Alentejo-Andalusia

J. Muñuzuri, L. Onieva, J. Guadix, P. Cortés

***Abstract*—**The aeronautical sector represents the main source of industrial development in the South of the Iberian Peninsula, with the establishment of key players like Embraer in Alentejo or Airbus in Andalusia. Subsequently, the economic promotion policies implemented in both neighbouring regions seek to consolidate a trans-border aeronautical cluster to gain critical mass and seek synergies between companies and research centres.

The first step of the proposed scheme entails the identification of common interests shared by companies, technological centres and university research groups in both regions. This involves determining the specific type of activities carried out at the different companies established in the two regions (ranging from OEMs to SMEs), and also building a catalogue of available infrastructures and skills on the side of research centres and universities. The results of this first step reveal potential one-to-one partnerships, and also highlight the aggregate strengths and needs of the two regions within the aeronautical sector, taking into account both the current scenario and its expected evolution.

The second step of the scheme focuses on the particularly relevant companies identified in the first step, and consists of the completion of in-depth technological audits liable to suggest potential development actions or R&D projects in those companies, counting when possible on the capabilities shown by other members of the cluster. These technological audits follow a three-round process aimed at identifying specific needs, validating those identifications and suggesting possible actions to be taken.

The final objective of this methodology is to enhance the economic activity in the aeronautical sector in both regions, always with an innovative perspective. The success of the scheme should be measured in terms of partnerships created, R&D projects initiated, and spin-off companies generated.

***Keywords*—**Aeronautical sector, innovation plans, technology transfer, trans-border cluster.

I. Introduction

THIS paper describes an initiative created to improve the innovation of companies in the aeronautical sector in the cross-border area between southern Spain (Andalusia) and Portugal (Alentejo) through the development of training activities, exchange of experiences and knowledge transfer among companies of the aeronautic sector.

This is a strategic sector in both regions, as shown by the relevant aggregate figures. In Andalusia, it represented a turnover of 2,400 M€ in 2016, with a 2.4% increase with respect to the previous year, and provided 14,500 specialized jobs (+5.26%), accounting for 1.62% of the regional GDP. On the other hand, in Alentejo it represented a turnover of 1,700 M€ and 18,000 jobs, resulting in an export capacity of 87%.

The main objective of the initiative is to improve the participation of the business sector in the innovation processes and in R&D&I activities related to the market, and to enhance cross-border synergies between both regions. It thus involved aeronautical companies, infrastructures, research centers and regional institutions on both sides of the border. The main results expected from the initiative are an increase in the number of spin-off companies, patents, research projects and technology transfer activities.

To achieve these general objectives, three main goals have been defined. According to Lazoi et al. (2011), the increasing complexity of aeronautical industry products makes it difficult for companies to innovate in isolation. Particularly, for small and medium enterprises, cooperation and creation of networks, which are driven by geographic clusters, are fundamental requirements for improving their capability for innovation (Steiner et al., 2010).

Consequently, the first goal established is to improve business innovation in the aeronautical sector through greater cross-border cooperation.

Second, in a sector as globalised and in continuous evolution as that of aeronautics, it is essential to allocate continuous investment in R&D by companies to maintain competitiveness (Moraes et al., 2010). Accordingly, improvement in the use of infrastructures and investments in R&D in the cross-border area is another of the main goals pursued.

Finally, improvement in the use and capabilities of research centers is a fundamental objective, which is the reason that existing capabilities in the aeronautical sector of Alentejo and Andalusia must be characterized. There have been previous studies as regards the situation of the sector in Spain and Portugal (Alfonso-Gil, 2007), but due to the speed at which technology evolves in the aeronautical industry, this characterization has become another required task for this initiative.

In pursuit of the achievement of these objectives, three different lines of action were describes. The remainder of the paper describes in detail each one of the actions carried out as well as those planned to be achieved in each of these lines of work. The final section concludes reviewing the main findings of the initiative and the outcomes that can be expected from it.

II. Identification of R&D Needs and Capabilities of the Aeronautical Sector

For the identification of R&D needs and capabilities of the technological centers, companies and universities of both regions, a series of questionnaires were generated, out of which 103 completed responses were obtained, in particular, 71 from Portuguese entities and 32 from Andalusian entities.

Based on the information gathered from these questionnaires, a database has been created that includes the

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Detection of Trends and Break Points in Climatic Indices: The Case of Umbria Region in Italy

A. Flammini, R. Morbidelli, C. Saltalippi

***Abstract*—**The increase of air surface temperature at global scale is a fact, with values around 0.85 °C since the late nineteen century, as well as a significant change in main features of rainfall regime. Nevertheless, the detected climatic changes are not equally distributed all over the world, but exhibit specific characteristics in different regions. Therefore, studying the evolution of climatic indices in different geographical areas with a prefixed standard approach becomes very useful in order to analyze the existence of climatic trend and compare results. In this work, a methodology to investigate the climatic change and its effects on a wide set of climatic indices is proposed and applied at regional scale in the case study of a Mediterranean area, Umbria region in Italy. From data of the available temperature stations, nine temperature indices have been obtained and the existence of trends has been checked by applying the non-parametric Mann-Kendall test, while the non-parametric Pettitt test and the parametric Standard Normal Homogeneity test (SNHT) have been applied to detect the presence of break points. In addition, aimed to characterize the rainfall regime, data from 11 rainfall stations have been used and a trend analysis has been performed on cumulative annual rainfall depth, daily rainfall, rainy days, and dry periods length. The results show a general increase in any temperature indices, even if with a trend pattern dependent of indices and stations, and a general decrease of cumulative annual rainfall and average daily rainfall, with a time rainfall distribution over the year different from the past.

***Keywords*—**Climatic change, temperature, rainfall regime, trend analysis.

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Development of Column-Filters of Sulfur Limonene Polysulfide to Mercury Removal from Contaminated Effluents

Galo D. Soria, Jenny S. Casame, Eddy F. Pazmino

Abstract—In Ecuador, mining operations have significantly impacted water sources. Artisanal mining extensively relies in mercury amalgamation. Mercury is a neurotoxic substance even at low concentrations. The objective of this investigation is to exploit Hg-removal capacity of sulfur-limonene polysulfide (SLP), which is a low-cost polymer, in order to prepare granular media (sand) coated with SLP to be used in laboratory scale column-filtration systems. Preliminary results achieved 85% removal of Hg^{++} from synthetic effluents using 20-cm length and 5-cm diameter columns at 119m/day average pore water velocity. During elution of the column, the SLP-coated sand indicated that Hg^{++} is permanently fixed to the collector surface, in contrast, uncoated sand showed reversible retention in Hg^{++} in the solid phase. Injection of 50 pore volumes decreased Hg^{++} removal to 46%. Ongoing work has been focused in optimizing the synthesis of SLP and the polymer content in the porous media coating process to improve Hg^{++} removal and extend the lifetime of the column-filter.

Keywords—column-filter, mercury, mining, polysulfide, water treatment

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Development of Tools for Multi Vehicles Simulation with Robot Operating System and ArduPilot

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***Abstract*—One of the main difficulties in developing multi-robot systems (MRS) is related to the simulation and testing tools available. Indeed, if the differences between simulations and real robots are too significant, the transition from the simulation to the robot won't be possible without another long development phase and won't permit to validate the simulation. Moreover, the testing of different algorithmic solutions or modifications of robots requires a strong knowledge of current tools and a significant development time. Therefore, the availability of tools for MRS, mainly with flying drones, is crucial to enable the industrial emergence of these systems. This research aims to present the most commonly used tools for MRS simulations and their main shortcomings and presents complementary tools to improve the productivity of designers in the development of multi-vehicle solutions focused on a fast learning curve and rapid transition from simulations to real usage. The proposed contributions are based on existing open source tools as Gazebo simulator combined with ROS (Robot Operating System) and the open-source multi-platform autopilot ArduPilot to bring them to a broad audience.**

***Keywords*—ROS, ArduPilot, MRS, simulation, drones, Gazebo.**

I. Introduction

MULTI-ROBOT systems (MRS) are systems composed of several mobile robots. Thanks to their intrinsic robustness and modularity, they can perform complex tasks more efficiently than robots alone [1]. If MRS are studied intensively today [2], [3], there are still very few industrial uses. Indeed, the MRS are complex to analytically model. Secondly the design of hardware and software parts are also tricky [4]. The process of developing, testing and debugging a group of robots is a difficult and time-consuming task given the number and complexity of the entities used. This paper presents a set of new simulation and testing tools for MRS to reduce the complexity of their development. Section II provides an analysis of the main tools used in MRS research. Then Section III presents the autopilot for robots and why they should be used. Finally, Section IV provides details of a new simulation tool.

This works targets small mobile robots, which are robotic entities capable of moving in their environment. This definition includes mobile robots (Unmanned Ground Vehicles or UGVs), flying robots (Unmanned Aerial Vehicles or UAVs), boats, etc., but excludes robotics arms.

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II. Simulation Tools

A. Simulators

The perfect simulator does not yet exist, but there are some that are able to approach current robotic reality in order to demonstrate and compare different solutions to a robotic problem. Among the most famous are the following:

- The Player/Stage suite [5]: It's a 2D open source robotic simulator. It natively supports multi-robot systems with a small sensor database. The suite is also compliant with the ROS (Robot Operating System) [6] middleware to extend its simulation capabilities. However, the models used are aging (no drone, no wireless networks, etc.) and the project is only little maintained to keep compability with ROS.
- Gazebo [7]: It is an open source 3D simulator, only available under Linux. It is the reference for 3D open source robotic simulators.
  - Ability to accurately simulate complex robots such as Atlas or Valkyrie or drones such as the 3DR Iris.
  - Gazebo is flexible. It is possible to simulate a complex robot like a cloud of drones by simply reconfiguring it. In addition, there are a multitude of plug-ins that increase the already present possibilities (sensor, physical model, etc.).
  - Integration with ROS. Robots can be simulated with the real code that will be running in their embedded systems.
  - Simulations performed on Gazebo with ROS can be replayed using logging.
  - A strong community.
- V-Rep [8]: A simulator similar to Gazebo, but not free nor open source. It is therefore a multiplatform 3D simulator. The advantage of V-Rep over Gazebo is its professional support and better learning curve. Nevertheless, the use of V-Rep in combination with real robots can only be done through the use of ROS.
- MORSE [9]: It is a simulator built on a set of Python libraries that uses the Blender software engine to interface a virtual 3D environment with external software. Open source and cross-platform, it allows to simulate a large number of sensors and robots. Its advantage is based on its modularity and its implementation in python which allows you to quickly get to grips with it. Nevertheless, it is less used than Gazebo or V-Rep and lacks of real examples other than the documentation that make its learning curve hard.

Diagnosis of Logistics Processes: Bibliometric Review and Analysis

S. F. Bayona, J. Nunez, D. Paez

Abstract—The diagnostic processes have been consolidated as fundamental tools in the adequate knowledge of organizations and their processes. The diagnosis is related to the interpretation of the data, findings and the relevant information, to determine problems, causes, or the simple state and behavior of a process, without including a solution to the problems detected. The objective of this work is to identify the necessary stages to diagnose the logistic processes in a metalworking company, from the literary revision of different disciplines. A total of 62 articles were chosen to identify, through bibliometric analysis, the most cited articles, as well as the most frequent authors and journals. The results allowed to identify the two fundamental stages in the diagnostic process: a primary phase (general) based on the logical subjectivity of the knowledge of the person who evaluates, and the secondary phase (specific), related to the interpretation of the results, findings or data. Also, two phases were identified, one related to the definition of the scope of the actions to be developed and the other, as an initial description of what was observed in the process.

Keywords—business, diagnostic, management, process

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Distance Learning via Mobile Technology: Enhancing Experiential Learning on Hong Kong Architecture

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Abstract—This research aims at demonstrating the benefits of distance or mobile learning via a mobile app to enhance experiential learning on Hong Kong architecture, based on a project on mapping entertainment buildings along the tram route of Hong Kong island. In the 1950s, large numbers of emigrants moved from Shanghai to Hong Kong to escape the turmoil of war, and settled in the North Point area along King's Road. This first wave of emigrants is said to have introduced a lot of Shanghai-style restaurants and barbershops to this area, as well as establishing the Sunbeam Theatre along the tram route as a landmark for Cantonese opera, a significant site of everyday social entertainment to this day. Along the same road and tram route, interestingly, the Empire Theatre (currently State Theatre) also opened in the 1950s, as the first deluxe theatre in the North Point district. Both theatres still remain today, experiencing similar issues in maintaining its function as a theatre, particularly recent in the case of the State Theatre that narrowly escaped demolition. However, a lot of the neighbouring entertainment buildings have already been demolished, and a socio-history of entertainment along the tram route in Hong Kong are missing in academia, and in need of repositioning in the field. This paper will aim at revisiting the urbanscape created by the cinemas and entertainment sites on Hong Kong island, both demolished and existing, to recreate a socio-historical map of entertainment in the city in the form of a mobile app. Both the public and students will be able to adopt mobile learning by downloading this app on to their handheld devices and revisit these places in enhancing an experiential learning pedagogy. Building upon international strategies in conserving sites along tram routes, this research will also aim at suggesting and formulating improved directions for Hong Kong heritage policy in conserving not only individual theatres but broader areas of entertainment sites in a densely populated urban area.

Keywords—experiential learning, mobile learning, cultural heritage, cinema architecture

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Distorted Document Images Dataset for Text Detection and Recognition

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Abstract—With the increasing popularity of document analysis and recognition systems, text detection (TD) and optical character recognition (OCR) in document images become challenging tasks. However, according to our best knowledge, no publicly available datasets for these particular problems exist. In this paper, we introduce a Distorted Document Images dataset (DDI-100) and provide a detailed analysis of the DDI-100 in its current state. To create the dataset we collected 7000 unique document pages, and extend it by applying different types of distortions and geometric transformations. In total, DDI-100 contains more than 100,000 document images together with binary text masks, text and character locations in terms of bounding boxes. We conduct the experiments with several TD and OCR approaches trained on the introduced dataset. Obtained results demonstrate the usefulness of DDI-100 dataset to achieve high-quality results using a small amount of real data.

Keywords—Document analysis, open dataset, optical character recognition, text detection.

I. Introduction

Nowadays document image analysis is still a relevant and challenging problem in computer vision [1], [2], [3], [4]. The ability to recognize document by its photo can simplify the process of document flow and help with numerous real-world tasks, for example, text detection and recognition [5], document image dewarping [6], [7], layout recognition [8] and etc. However, according to our best knowledge, all publicly available datasets for most relevant problems contain one hundred images at best. Nowadays it becomes necessary to be able to work with photos of documents of a bad quality due to the prevalence of smartphones and digitalization of the document exchange process.

The absence of large-scale document image datasets is a serious problem which has an impact on the current state of research in this area. It raises the entry barrier by throwing out researchers who don't have the resources to create their own datasets. Moreover, it is also difficult to compare different models with each other because they are tested on different datasets, which often have a small size. To overcome these difficulties we present the DDI-100 dataset, which is larger than existing datasets. It is based on publicly available documents and reports, extended by various geometric deformations and distortions. We believe that this dataset of document images will push the creation of more advanced models in the field of document image analysis and allow researchers to compare and test different approaches. The dataset is publicly available at https://github.com/machine-intelligence-laboratory/DDI-100.

The rest of this paper is organized as follows. Firstly, we consider related datasets and compare them with the DDI-100 dataset. In section 3 we provide a detailed description of the DDI-100 in its current state. Section 4 is devoted to experimental baselines in TD and OCR tasks applied to the presented dataset and real data. Section 5 concludes the results and contribution of this paper.

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II. Related Datasets

The main contribution of this work is a large-scale dataset for detecting and recognizing text in the field of document images processing. For this reason, we restrict the discussion to related datasets.

The first dataset for text detection and recognition was the ICDAR Robust Reading challenge [9] that is known as ICDAR 03. It consists of 509 scene images with centered text. After the further iterations of the datasets [10], [11] that contains only horizontal English texts in [12] authors presented a dataset of 89 images with text of various directions. To overcome the problem of small data size a new dataset MSRA-TD500 [13] was realized. It includes 500 images of indoor and outdoor scenes. Another example of the natural scene text dataset is SVT dataset [14] that harvested from Google Street View [1]. The dataset contains 350 total images and 725 total labeled words which often has low resolution. However, it comprises annotations not for all text in the images.

The newest iteration of the ICDAR Robust Reading challenge [15] introduced a dataset of 561 images with a minimum size of 100×100 pixels. The authors analyzed 315 Web pages, 22 spam and 75 ham emails and extracted all the images with text. Based on these images the dataset for the word recognition problems was also collected. It consists of 5003 words with a length of at least 3 characters long. In [16] a new challenge on Incidental Scene Text was presented that focuses on real scene images. The dataset includes Latin-scripted text and text in a number of Orient scripts. It contains 1670 images

[1] http://maps.google.com

Distribution and Diversity of Pyrenocarpous Lichens in India with Special Reference to Forest Health

Gaurav Kumar Mishra, Sanjeeva Nayaka, Dalip Kumar Upreti

Abstract—Our nature exhibited presence of a number of unique plants which can be used as indicator of environmental condition of particular place. Lichens are unique plant which has an ability to absorb not only organic, inorganic and metaloties but also absorb radioactive nuclide substances present in the environment. In the present study pyrenocarpous lichens will used as indicator of good forest health in a particular place. The Pyrenocarpous lichens are simple crust forming with black dot like perithecia have few characters for their taxonomical segregation as compared to their foliose and fruticose brethrean. The thallus colour and nature, presence and absence of hypothallus are only few characters of thallus are used to segregate the pyrenocarpous taxa. The fruiting bodies of pyrenolichens i.e. ascocarps are perithecia. The perithecia and the contents found within them posses many important criteria for the segregation of pyrenocarpous lichen taxa. The ascocarp morphology, ascocarp arrangement, the perithecial wall, ascocarp shape and colour, ostiole shape and position, ostiole colour, ascocarp anatomy including type of paraphyses, asci shape and size, ascospores septation, ascospores wall and periphyses are the valuable charcters used for segregation of different pyrenocarpous lichen taxa. India is represented by the occurrence of the 350 species of 44 genera and eleven families. Among the different genera Pyrenula is dominant with 82 species followed by the Porina with 70 species. Recently, systematic of the pyrenocarpous lichens have been revised by American and European lichenologists using phylogenetic methods. Still the taxonomy of pyrenocarpous lichens is in flux and information generated after the completion of this study will play vital role in settlement of the taxonomy of this peculiar group of lichens worldwide. The Indian Himalayan region exhibit rich diversity of pyrenocarpous lichens in India. The western Himalayan region has luxuriance of pyrenocarpous lichens due to its unique topography and climate condition. However, the eastern Himalayan region has rich diversity of pyrenocarpous lichens due to its warmer and moist climate condition. The rich moist and warmer climate in eastern Himalayan region supports forest with dominance of evergreen tree vegetation. The pyrenocarpous lichens communities are good indicator of young and regenerated forest type. The rich diversity of lichens clearly indicates that moist of the forest within the eastern Himalayan region has good health of forest. Due to fast pace of urbanization and other developmental activities will defiantly have adverse effects on the diversity and distribution of pyrenocarpous lichens in different forest type and the present distribution pattern will act as baseline data for carried out future biomonitoring studies in the area.

Keywords—lichen diversity, indicator species, environmental factors, pyrenocarpous

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Drivers' Behavior at Roundabout

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Abstract—It is very interesting to a big variation in drivers' behavior at roundabout intersection. By analyzing crashes three years before and after roundabout converting at 19 intersections, it is discovered that the differences are closely associate with type of traffic control before the roundabout conversion, setting (rural vs. urban) and environmental conditions. While in general, roundabout can save lives, but if also increase single vehicle crashes particularly in rural intersections without street light at night. To improve roadway intersection safety, it is critical to understand possible driver behavior in roundabout design and corresponding traffic control devices.

Keywords—roundabout, intersection safety, driver behavior, design and traffic control

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Effect of Processing on Reduction of Pesticides Residues in Orange Samples

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***Abstract*—**The widespread use of pesticides for improving agricultural productivity or food security, despite the fact that they can have negative health effects on consumers is a constant hazard. The aim of the experiments was to investigate the effects of household processing on reduction behavior, processing factor (PFs) and estimate the extent of removal of three pesticide residues (chlorpyrifos, metalaxyl, and diazinon) in contaminated samples of orange. The pesticide residues were detected using the "Quick, Easy, Cheap, Effective, Rugged, and Safe" (QuEChERS) extraction. Gas Chromatography along with mass spectrometer (GC/MS) were used for the analysis. The effects of household processing on the levels of the three pesticide residues were quantified. The juicing and pulping processing method showed decreasing concentration of residues for all pesticides up to ~ 87%. It was the most effective process to remove pesticide residues from oranges. The second process; washing, elicited less reduction compared to juicing and pulping. However it was observed that the level of pesticide residues was also reduced by a third process, (sonication in the ultrasonic bath).. Sonication treatments could effectively remove the chlorpyrifos and Diazinon residue spiked in orange matrices than the Metalaxyl residues. Overall any one of these processes contributes substantially to reduce consumer exposure to pesticides residues in orange.

***Keywords*—**GC/MS, Pesticides, Processing Factor, Orange.

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Effects of Humidity and Silica Sand Particles on Vibration Generation by Friction Materials of Automotive Brake System

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Abstract—This paper introduces an experimental study of vibration generated by friction materials of automotive disc brake system using brake test rig. Effects of silica sand particles which are available on the road surface as an environmental condition with a size varied from 150 to 600 μm are evaluated. Also, the vibration of the brake disc is examined against the friction material in humidity environment conditions under variable rotational speed. The experimental results showed that the silica sand particles have significant contribution on the value of vibration amplitude which enhancing with increasing the size of silica sand particles at different speed conditions. Also, it is noticed that the friction material is sensitive to humidity and the vibration magnitude increasing under wet testing conditions. Moreover, It can be reported that with increasing the applied pressure and rotational l speed of the braking system, the vibration amplitudes decreasing for all cases.

Keywords: Friction material; silica sand particles; humidity environment; vibration of brake.

I. INTRODUCTION

The friction material plays essential roles in various aspects of the brake performance such as a stopping distance, pedal feel, counter disk wear, and friction induced vibrations. The main requirements of friction materials are to supply unchanging friction coefficient and a small wear rate at several environmental and operation conditions. Moreover, the friction materials should be compatible with the rotor material to reduce its vibration, wear, and noise along braking action [1-3].

In the last few years, many researchers have investigated the brake vibration in vehicle to improve vehicle users' comfort. Despite these efforts, the correlation between the physical properties of brake lining materials, the characteristic of friction layer, and their propensity to friction induced vibration generation have been poorly understood. Therefore, investigation of the relationship between the vibrations and properties of the brake lining materials are required [4].

The study of particle effect on brake performance has becoming a big subject between the investigators in current researchers. Eriksson [5] and later Bergman et al. [6] among the early researcher who relate the noise effect of brakes contact condition with the wear particles forming during the sliding process. While some researchers had found that third body formation of trapped material of pad and disc during braking process influence the braking process and brake performance [7]. Wahlstrom [8] and Sanders [9] had study the effect of airborne wear particle which come from various source and occur in size intervals and found the number and size distribution that contribute to the wear mechanism of vehicle brake. Abdul Hamid [10] studied the effect of different particle grit size on the accumulation and friction characteristic of brake system and found that the particle size affects the friction performance at certain sliding speed and pressure. The sand particles were examined at different brake pressures, disc temperatures and speeds. The experimental results found that both sand particles have a substantial effect on the brake noise occurrences [11].

This paper is focused on experimental work of disc brake vibration using brake test rig. Accelerometers are utilized capture amplitude and vibration frequency. Conducting a series of tests under different conditions of disc speed and applied pressure are measured. Influence of silica sand particles with a size range between 150 to 600 μm which most available on the road surface are evaluated. Also, water is sprayed on the friction material as an easy way to introduce the humidity condition and its effect on vibration generation is examined.

II. DEVELOPMENT OF BRAKE TEST RIG

Automotive disc brake test rig is designed to provide the necessary rotation speed and applied pressure to the different braking applications. Figure 1, shows the brake test rig that has currently been developed. The driving unit consists of a 7.5 kW, 3 Phase AC motor with 413 Nm maximum torque. The desired speed is adjusted based on frequency mode to change rotating speeds. Brake assembly is fixed with the drive motor through a mild steel coupling and driving shaft, which is carried by two ball bearings. The required applied pressure is conducted by a hydraulic system, as shown in Figure 2. All instruments are fastened to assess the operational and environmental parameters during braking event. A S-type load cell is used to measure coefficient of friction during the braking process by the measured braking force. Digital tachometer model DT2236B with range between 1 to 1000 rpm is used to measure actual rotational speed with resolution of 0.1 rpm. Infrared thermometer with range between 20-250°C is used to measure the temperature between the disc and friction brake. The main purpose of measured temperature is to insure that the temperature of the braking within the required range. A piezoelectric accelerometer type 4370 with Voltage sensitivity 10 mV/ms^{-2} is used to acquire the acceleration signals. The accelerometer output signal is

Electrocardiogram and Photoplethysmogram Analysis for Blood Pressure Estimation

Alexander N. Kalinichenko, Diana C. Martinez

Abstract—The central objective of this research is based on finding out some assertive and robust photoplethysmogram's (PPG) and electrocardiogram's (ECG) blood pressure related parameters by the implementation of a method with innovations in signal processing and analysis. The biomedical ECG and PPG signals are recorded using a mobile monitor CardioQVark. In addition, a reference systolic and diastolic blood pressure is measured using a conventional sphygmomanometer. In order to increase the cuffless blood pressure measurement accuracy, a technique, which involves not only the ECG and PPG joint parameters extraction but also some individual PPG's morphology features, is proposed in this work. In the first place, the biomedical ECG and PPG signals are time-frequency analyzed in order to reduce or avoid the motion artifacts and high-frequency noises that appear during the signal recording and compromise the purpose of quality. Secondly, some novel parameters from the morphology of photoplethysmogram's signal which may be correlated with blood pressure are considered along with the pulse transit time. Additionally, a neural network is built to determine the relation between the estimated and reference blood pressure. Finally, the correlation coefficient and the regression line are obtained to evaluate feasibility. The results show a strong correlation between the estimated and reference blood pressure which opens up opportunities for the cuffless estimation of blood pressure.

Keywords—blood pressure, electrocardiogram, mobile monitor, neural network, photoplethysmogram, PTT

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Evaluation of Arsenic Removal in Soils Contaminated by the Phytoremediation Technique

V. Ibujés, A. Guevara, P. Barreto

***Abstract*—**Concentration of arsenic represents a serious threat to human health. It is a bioaccumulable toxic element and is transferred through the food chain. In Ecuador, values of 0.0423 $mg \cdot kg^{-1}$ As are registered in the potatoes of the skirts of the Tungurahua volcano. The increase of arsenic contamination in Ecuador is mainly due to mining activity, since the process of gold extraction generates toxic tailings with mercury. In the Province of Azuay, due to the mining activity, the soil reaches concentrations of 2,500 to 6,420 $mg \cdot kg^{-1}$ As whereas in the province of Tungurahua it can be found arsenic concentrations of 6.9 to 198.7 $mg \cdot kg^{-1}$ due to volcanic eruptions. Since the contamination by arsenic, the present investigation is directed to the remediation of the soils in the provinces of Azuay and Tungurahua by phytoremediation technique and the definition of a methodology of extraction by means of analysis of arsenic in the system soil-plant. The methodology consists in the selection of two types of plants that have the best arsenic removal capacity in synthetic solutions 4.5 $mg \cdot L^{-1}$ As, a lower percentage of mortality and hydroponics resistance. The arsenic concentrations in each plant were obtained from taking 10 ml aliquots and the subsequent analysis of the ICP-OES (Inductively coupled plasma - optical emission spectrometry) equipment. Soils were contaminated with synthetic solutions of arsenic with the capillarity method to achieve an arsenic concentration of 13 and 15 mg.kg. Subsequently, two types of plants were evaluated to reduce the concentration of arsenic in soils for 7 weeks. The global variance in soil types was obtained with the InfoStat program. To measure the changes in arsenic concentration in the soil-plant system, the Rhizo and Wenzel arsenic extraction methodology was used and subsequently analyzed with the ICP-OES (optima 8000 Pekin Elmer). As a result, the selected plants were bluegrass and ribwort plantain, due to the high percentages of arsenic removal of 55% and 67% and low mortality rates of 9% and 8% respectively. In conclusion, Azuay soil with an initial concentration of 13 $mg \cdot kg^{-1}$ As reached the concentrations of 11.49 and 11.04 $mg \cdot kg^{-1}$ As for bluegrass and ribwort plantain respectively, and for the initial concentration of 15 $mg \cdot kg^{-1}$ As reached 11.79 and 11.10 $mg \cdot kg^{-1}$ As for blue grass and ribwort plantain after 7 weeks. For the Tungurahua soil with an initial concentration of 13 $mg \cdot kg^{-1}$ As it reached the concentrations of 11.56 and 12.16 $mg \cdot kg^{-1}$ As for the bluegrass and ribwort plantain respectively, and for the initial concentration of 15 mg/kg As reached 11.97 and 12.27 $mg \cdot kg^{-1}$ Ace for bluegrass and ribwort plantain after 7 weeks. The best arsenic extraction methodology of the soil - plant system is Wenzel.

***Keywords*—**Blue Grass, ribwort plantain, phytoremediation, soil of Azuay, soil of Tungurahua, Synthetic arsenic solution.

I. INTRODUCTION

ARSENIC is a metalloid that is present in air, soil, water and food [1]. The oxidation number of arsenic is -3, 0, +3 and +5, which allows to combine with several elements and form organic and inorganic compounds. [2]. The toxicity depends on its binding form. Organic arsenic compounds are less toxic than inorganic arsenic compounds [3].

The problem of arsenic contamination in the soil is due to industrial activity [4], deposits of arsenic minerals near water sources [5] and volcanic eruptions, which affects the human health because arsenic is transferred through the food chain [6]. Diseases like, hyperpigmentation, keratosis and vascular complications occur when the consumption of inorganic arsenic is greater than 0.3 $\mu g \cdot kg^{-1} \cdot dia^{-1}$ and neurological and hematological problems in doses of 0,05 to 1 $mg \cdot kg^{-1} \cdot dia^{-1}$ [7].

A. Natural and anthropogenic arsenic in the soil

The average concentration of arsenic in the earth's crust varies between 1,5 to 2 $mg \cdot kg^{-1}$, and its distribution is in igneous rocks of 1,5 to 3 $mg \cdot kg^{-1}$, sedimentary rocks of 1,7 to 400 $mg \cdot kg^{-1}$ [8]. Arsenic is introduced into the soil and water during the erosion of rocks and minerals, followed by subsequent leaching and runoff [9]. It is part of more than 200 minerals that are distributed in the form of 60% of arseniates, 20% of sulfides and sulfides, and 20% of arsenides, arsenites, oxides and silicates [10].

Generally arsenic concentration in soil and water is low between 1 to 2 $\mu g \cdot L^{-1}$ because of the mineralization of the rock and the activity of microorganisms that cause arsenic solubilization [11]. Here is an increase in aquifers in zones richer in sulfur ore or sediments of volcanic origin, greater than 12 $mg \cdot L^{-1}$ [5]. These increases in the amount of arsenic in the soil are due to mobility under reducing conditions, variations in pH, increase in carbonates or the dissolution of arsenic salts such as sodium arsenite or arsenate in water, due to microbial activity [12].

Volcanic eruptions are also part of the increase in the amount of arsenic in the soil [3] that reach values between 2 to 6 300 $mg \cdot kg^{-1}$ because of the ash [9]. In Ecuador, the soil on the slopes of the Tungurahua volcano reaches values of 6,9 $mg \cdot kg^{-1}$ [4] due to the leaching of the arsenic contained in the ash of 110 $\mu g \cdot L^{-1}$ [13].

Anthropogenic sources of soil contamination with arsenic are: batteries, paints, tanning, synthetic chemistry, pesticides, fertilizers, foundries, mining areas and coal combustion [7]. One of the sectors that generates arsenic contamination in the soil is mined with concentrations of 52 700 to 63 000 $mg \cdot kg^{-1}$, because of the waste from metallurgical processes, more than 20 000 $mg \cdot kg^{-1}$ of arsenic have been reported in abandoned mines and 62 350 to 7 000 $mg \cdot kg^{-1}$ in some tailings [9].

The reason for these high concentrations are the processes of extracting gold from arsenical minerals [14], which generate waste confined in dams or tailings [9]. In many cases, they do not have any protection over the action

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Evaluation of Arsenic Removal in Synthetic Solutions and Natural Waters by Rhizofiltration

P. Barreto, A. Guevara, V. Ibujés

Abstract— In this study, the removal of arsenic from synthetic solutions and natural water from Papallacta lagoon was evaluated, by using the rhizofiltration method with terrestrial and aquatic plant species. Ecuador is a country of high volcanic activity, that is why most of water sources come from volcanic glaciers. Therefore, it is necessary to find new, affordable and effective methods for treating the water. The water from Papallacta Lagoon shows levels from 327 $\mu g.L^{-1}$ to 803 $\mu g.L^{-1}$ of arsenic. The evaluation for the removal of arsenic began with the selection of 16 different species of terrestrial and aquatic plants. These plants were immersed to solutions of 4500 $\mu g.L^{-1}$ arsenic concentration, for 48 hours. Subsequently, 3 terrestrial species and 2 aquatic species were selected based on the highest amount of absorbed arsenic they showed, analyzed by plasma optical emission spectrometry (ICP-OES), and their best capacity for adaptation into the arsenic solution. The chosen terrestrial species were cultivated from their seed with hydroponics methods, using coconut fiber and polyurethane foam as substrates. Afterwards, the species that best adapted to hydroponic environment, were selected. Additionally, a control of the development for the selected aquatic species was carried out using a basic nutrient solution to provide the nutrients that the plants required. Following this procedure, 30 plants from the 3 types of species selected were exposed to a synthetic solution with levels of arsenic concentration of 154, 375 and 874 $\mu g.L^{-1}$, for 15 days. Finally, the plant that showed the highest level of arsenic absorption was placed in 3 L of natural water, with arsenic levels of 803 $\mu g.L^{-1}$. The plant laid in the water until it reached the desired level of arsenic of 10 $\mu g.L^{-1}$. This experiment was carried out in a total of 30 days, in which the capacity of arsenic absorption of the plant was measured.

As a result, the five species initially selected to be used in the last part of the evaluation were: Sunflower (Helianthus annuus), Clover (Trifolium), Blue grass (Poa pratensis), Water hyacinth (Eichhornia crassipes) and Miniature aquatic fern (Azolla). The best result of arsenic removal was showed by the Water hyacinth with a 53,7% of absorption, followed by the Blue grass with 31,3% of absorption. On the other hand, the Blue grass was the plant that best responded to the hydroponic cultivation, by obtaining a germination percentage of 97% and achieving its full growth in two months. Thus, it was the only terrestrial species selected. In summary, the final selected species were blue grass, water hyacinth and miniature aquatic fern. These three species were evaluated by immersing them in synthetic solutions with three different arsenic concentrations (154, 375 and 874 $\mu g.L^{-1}$). Out of the three plants, the Water Hyacinth was the one that showed the highest percentages of arsenic removal with 98, 58 and 64%, for each one of the arsenic solutions. Finally, 12 plants of Water Hyacinth were chosen to reach an arsenic level up to 10 $\mu g.L^{-1}$ in natural water. This significant arsenic concentration reduction was obtained in 5 days. In conclusion, it was found that Water hyacinth is the best plant to reduce arsenic levels in natural water.

Keywords— Arsenic, natural water, plant species, rhizofiltration, synthetic solutions.

I. Introduction

ARSENIC is a high-risk element for the population, according to the World Health Organization (WHO). It can be found organically and inorganically, but the inorganic form is the most toxic by organic form [45]-[27]. This element is used in the glass industry, medicine, electronics (semiconductor), textiles, agriculture (fertilizer, pesticides, fungicides, herbicides), preservatives (wood), mining (casting Au and Cu), etc. [51]. It is present in 200 minerals such as: arsenopyrite (FeAsS), arsenolite (As_2O_3), realgar (AsS), minerals of volcanic origin, among others.

Arsenic contamination in surface and groundwater is due to several reasons such as: erosion of rocks, volcanic eruptions, weathering of minerals that are subsequently deposited in aquifers. This can cause the entry of this metal into the food chain by the intake of seafood, poultry, dairy products and cereals. Arsenic usually shows long-term symptoms of human poisoning, which be pigmentation changes in the skin, hyperkeratosis, skin cancer, bladder and lung, cardiovascular problems, infant mortality, etc. [61]-[27]-[69]. The threshold limit of arsenic according to the World Health Organization (WHO) to ensure water quality is 10 $\mu g.L^{-1}$ On the planet, arsenic concentrations greater than 5 000 $\mu g.L^{-1}$ in groundwater are recorded, affecting a total of 140 million people in 70 countries [52]-[65]. In Bangladesh, groundwater wells used for human consumption have been detected with concentrations of 10, 20 and up to 50 times the limit established by the WHO [57]

In Latin America, 15 of 20 countries have high levels of arsenic contamination in surface and groundwater. In Argentina, 1.2 million people in rural areas depend on groundwater sources that exceed the arsenic limit threshold established by the WHO. In countries such as Chile, Mexico and Bolivia, arsenic concentrations of 500, 1100 and 207 $\mu g.L^{-1}$ are reported, respectively, in underground waters and shallow wells destined for the population's consumption. The high concentrations of this region are attributed to multiple sources that include volcanic, geothermal and anthropogenic sources related to mining [27].

Ecuador, because it is in Pacific fire belt, has great volcanic activity. A total of 84 volcanoes are recorded, of which 31 are potentially active [31]. The provinces of Carchi, Imbabura, Cotopaxi and Tungurahua have arsenic levels between 113 to

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Experimental and Numerical Analysis of Diffusion Flame for Ammonium Perchlorate and Hydroxyl Terminated Polybutadiene Sandwiches

Muhammad Junaid Afzal, Hu Song Qi, Yang Peng, Noor Fatima Rashid

***Abstract*—**Diffusion flame plays an important role in combustion behavior and chemical kinetics of hydroxyl terminated polybutadiene (HTPB) based composite propellants. To study the effects, sandwich configuration of ammonium perchlorate and hydroxyl terminated polybutadiene (AP-HTPB) is used to study the flame characteristics and with the aid of numerical simulation, a comprehensive work is presented related to diffusion flame; the solution method includes detailed chemical kinetics, temperature distribution and concentration distribution of different radicals. The model is in spatially two-dimensional, steady state and includes condensed and gas phases at burning surfaces. Main objective in this paper is to analyze the diffusion flame of AP-HTPB sandwiches' regression surface and simulate the pressure effects. Combustion experiments are conducted at 3 and 5 MPa respectively and a numerical framework is developed for both gas-phase and turbulence model. Results obtained from numerical simulations are consisted with actual experimentation that concludes length of diffusion flame retracted when applied pressure increased.

***Keywords*—**Ammonium perchlorate, diffusion flame, flame structure, hydroxyl-terminated polybutadiene, numerical simulation, sandwich combustion modeling

I. Introduction

COMBUSTION of composite propellants is an incredibly complex set of reactions taking place in all 3-phases of solid, liquid and vapor formation within a heterogeneous mixture. The importance of the various possible reaction steps is dependent upon such considerations as propellant composition, how the various ingredients are included into propellant (e.g., particle size of oxidizer, mixing time, curing temperature, etc.) and the environment in which the propellant is burned (pressure, initial sample temperature, environmental gas, etc.). Each of these considerations is important since a change in one parameter causes other changes in the overall combustion behavior [1].

In order to simplify the chemical kinetics involved in combustion of composite propellants, two dimensional sandwich configuration of AP-HTPB laminates is preferred to study the flame structure [2]. During the combustion of mixture containing oxidizer and fuel components, mainly two types of flames can be formed: a premixed flame and diffusion flame [3], [4]. A premixed flame is formed by the combustion of the two components when they are premixed prior to burning in the combustion zone. The intermingled oxidizer and fuel component molecules in the premixed reactants then react homogenously. The temperature and the concentration of the products increase uniformly in the combustion zone. When the oxidizer and fuel components are physically separated and allowed to diffuse into each other in the combustion zone, a diffusion flame is formed. Since the molecular distributions of the oxidizer and fuel are not uniform, the temperature and combustion products are also not uniformly distributed in the combustion zone. Diffusion flame plays a vital role in controlling the combustion mode of AP and gaseous decomposition products of the AP, surrounded by polymeric hydrocarbon (HTPB) at the burning surface [5]-[7]. A close-up view of the combustion process of ammonium perchlorate is shown in Fig. 1.

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II. Sandwich Propellant Experiments

A. AP Pellet Preparation

As obtained ammonium perchlorate was ground into fine powder (around ~200 to 140 μm) and sieved through different mesh size screens. Small batches of different particle size were prepared by using 100~140 and 200~240 mesh sizes. In our experiments series, only two ranges of grain sizes 75-65 μm and 150-104 μm are selected and dried in the oven at 70 °C for 4 hours. Then AP pellets are formed with the help of hydraulic press by placing the dried powder of ammonium perchlorate into mild steel die; dimensions of each pellet are 5 x 1.2 x 60 mm. Pressure applied was in the range of 3.0~4.5 MPa depending upon particle size for a period of 6 minutes. The compression pressure and compression time utilized here are less than those reported by [8] (210 MPa and 20 mins, respectively), consequently the combined density of AP-HTPB sandwich samples prepared is measured to be 1.90 gm/cm^3 which is less than the single crystal density of ammonium perchlorate (1.975 gm/cm^3). The pellets were dried in oven at 70 °C for 2 hours and stored in a desiccator.

Experimental and Theoretical Investigation of Slow Reversible Deformation of Concrete in Surface-Active Media

Nika Botchorishvili, Olgha Giorgishvili

***Abstract*—**Many-year investigations of the nature of damping creep of rigid bodies and materials led to the discovery of the fundamental character of this phenomenon. It occurs only when a rigid body comes in contact with a surface-active medium (liquid or gaseous), which brings about a decrease of free surface energy of a rigid body as a result of adsorption, chemo-sorption or wetting. The reversibility of the process consists in a gradual disappearance of creep deformation when the action of a surface-active medium stops. To clarify the essence of processes, a physical model is constructed by using Griffith's scheme and the well-known representation formulas of deformation origination and failure processes. The total creep deformation is caused by the formation and opening of micro cracks throughout the material volume under the action of load. This supposedly happens in macroscopically homogeneous silicate and organic glasses, while in polycrystals (tuff, gypsum, steel) contacting with a surface-active medium micro crack are formed mainly on the grain boundaries. The creep of rubber is due to its swelling activated by stress.

***Keywords*—**Process reversibility, surface-active medium, Rebinder's effect, micro crack, creep.

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Exploring the Potential of Mobile Learning in Distance Higher Education: A Case Study of the University of Jammu, Jammu, and Kashmir

Darshana Sharma

***Abstract*—**Distance Education has emerged as a viable alternative to serve the higher educational needs of the socially and economically disadvantaged people of the remote, rural areas of Jammu region. The University of Jammu is a National Accreditation, and Assessment Council accredited, A+ university and has been accorded graded autonomy by the University Grants Commission. It is a dual mode university offering academic programmes through the regular departments and through the Directorate of Distance Education. The Directorate of Distance Education, University of Jammu still uses printed study material as a mode of instructional delivery. The development of technologies has assured increased interaction and communication for distance learners throughout the distance open learning institutions. Though it is tempting and convenient to adopt technology already being used by others, it may not prove effective for the simple reason that two institutions may be unlike in some respect. The use of technology must be conceived in view of the needs of the learners; geographical socio-economic-cultural and technological contexts and financial, administrative and academic resources of the institution. Mobile learning (m-learning) is a novel approach to knowledge acquisition and dissemination and is gaining global attention. It has evolved as one of the useful channels of distance learning promoting interaction between learners and teachers. It is felt that the Directorate of Distance Education, University of Jammu also needs to adopt new technologies to provide more effective academic and information support to distance learners in order to keep them motivated and also to develop self-learning skills. The chief objective of the research on which this paper is based was to measure the opinion of the distance learners of the DDE, the University of Jammu about the merits of mobile learning. It also explores their preferences for implementing mobile learning. The survey research design of descriptive research has been used. The data was collected from 400 distance learners enrolled with undergraduate and post-graduate programmes using self constructed questionnaire containing five-point Likert scale items arranging from strongly agree, agree, indifferent, disagree and strongly disagree. Percentages were used to analyse the data. The findings lead to conclude that mobile learning has a great potential for the DDE for reaching out to the rural, remotely located distance learners of the Jammu region and also to improve teaching learning environment. The paper also finds out the challenges in the implementation of mobile learning in the region and further makes suggestions for effective implementation of mobile learning in DDE, University of Jammu.

***Keywords*—**Directorate of Distance Education, Mobile learning, National Accreditation, and Assessment Council, University of Jammu.

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Extracting the Failure Criterion to Evaluate the Strength of Cracked Drills under Torque Caused by Drilling

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***Abstract*—**The destruction and defeat of drill pipes and drill rigs in oil wells often combined with a combination of shear modulus II and III. In such a situation, the strength and load bearing capacity of the drill are evaluated based on the principles of fracture mechanics and crack growth criteria. In this paper, using the three-dimensional stress equations around the Turkish frontier, the relations of the tense-tense criterion (MTS) are extracted for the loading of the combined II and III modulus. It is shown that in crisp deflection under loading of combination II and III, the level of fracture is characterized by two different angles: the longitudinal angle of deflection θ and the angle of the deflection of the alpha. Based on the relationships obtained from the MTS criterion, the failure criteria, the longitudinal angle of the theta failure and the lateral angle of the failure of the alpha are presented. Also, the role of Poisson's coefficient on these parameters is investigated in these graphs.

***Keywords*—**Most Tangential Tension Criterion, Longitudinal Angle of Failure, - Side Angle of fracture, Drills Crack.

I. Introduction

DUE to considerations of safety and designing structures with a lifetime, in the study of issues of crack deformation and failure of parts, a special place in industrial design has been found. The narrow and longitudinal members used in the horizontal or vertical drilling of oil wells, such as drill bits and its interconnecting pipes, are always exposed to bending and torsional loads, and if they are tense with large strains, It easily leads to the failure of the structure. The first cracks in this drill can be generated by bending loads on the outer surface of the drill. On the other hand, drilling capacity in the oil field is a function of torque and rotational speed. In the drilling of hard stones, which should be worn at a high rate, the drill rotates at a very high speed. In digging horizontal channels, the rotational speed may increase to 150rpm, which imposes a great twist on tubes and drills [1]. Therefore, the initial cracking due to bending loads under the loading of cracked parts (such as drill bits), the stress field and displacement at the tip of the cracks are divided into three independent states: Mode I, in which the crack levels are only perpendicular to the initial cracking region, Mode II, in which the cracking levels, without any opening, slip inside the plate. And mode III, in which case the cracking slopes of the crack without any opening are slipping apart from the plate and parallel to the cracked front. In practice, pure modes are rarely present, and crack growth often occurs in combination conditions. For example, leaving the initial nail in a rotating device under tight couplings is deformed under the II / III combination. In the process of digging rocks and creating oil wells, factors such as friction, accumulation of soils and stones, sedimentation shales, and chalk and drilling fluid composition, cause post-tension loads.

Due to mechanical disturbances in the drill movement and the change in the geometry of the channel and the maze of the path, the type and amount of these loads are constantly changing, and most of the cracks are exposed to a combination of shear loads inside and outside the plate.

Therefore, access to a suitable failure criterion for assessing the strength of cracked components under the loading of the II / III combined mode and predicting the growth path of the cracks to strengthen the structure in that direction is of particular importance in the drilling industry.

Load Combination Mode II / III

Due to the complexity of the crack analysis under shear load and in the three-dimensional space, this mode of loading is rarely studied. Although some researchers have been analytically or experimentally studying the loading of the III + II + I combination method, [2] and [3], their results are not suitable for conditions that are not present in Mode I. In the present study, the prediction of the growth path of cracks under the combined II and III method is based on the criterion of the most tangential stress [4]. First, the tensile field is expressed in the vicinity of the tip of the crack in a three-dimensional state, and then the use of the MTS criterion for determining the failure path under the loading of the combined mode III and II will be investigated.

II. Tension Field Around the Tip of the Three-Dimensional Crack

Tension field around the tip of the three-dimensional crack Although the stress field relations are very complex in the vicinity of the tip of the cracks in the three-dimensional state, Hartranft and Sieh [5] showed that by using a suitable axis,

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Eye Problems in Students during Gross Anatomy Laboratory Class in Burapha University, Chonburi, Thailand

Luksanaporn Krungkraipetch

***Abstract*—**A cadaver is embalmed via the infusion of chemical substances that include formalin, alcohol, glycerin, carbolic acid and dry. Those substances have specific roles. Anatomy students in laboratory during their dissection course are continually exposed to formaldehyde. The level of exposure to the agent depends on during of time spent in the gross anatomy laboratory. Formaldehyde can be toxic, allergenic and carcinogenic. Disorder of exposure include airway irritation, ocular irritation, nasopharyngeal cancers and congenital malformation. This research objective is to study about eyes problems in students who are studying in gross anatomy laboratory in Burapha University (2016). Data collected by questionnaire 97 samples. Student filled self-administered predesigned questionnaire. Then analyzed using descriptive statics which composes of percentile, mean, max and min. Most of them were female 72.04% and the average age was 19.65 years. 45.16% of the sample had good knowledge about formaldehyde. Good attitude protect the eye during gross anatomy laboratory = 89.25%. Behavior during procedure laboratory; wearing contact lens =18.28%, average time during gross anatomy laboratory = 5.03 hrs. /week. Eye problem; burning sensation = 46.43%, eye irritation = 43%, ocular pain = 25.59, epiphora = 24.07% and vision loss=15.37%. Comparing students who wearing contact lens and who not wearing contact lens: blurry eyes were four times and twice in irritation, burning eyes and eye pain. In conclusion, learning in gross anatomy laboratory class can cause eye problems. Always protect your eyes while you work in gross anatomy laboratory class.

***Keywords*—**Eye problem, student, gross anatomy laboratory, university.

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Fabrication of Alginate/Honey Scaffolds by 3D Bio-Printing and Studying Their Mechanical, Morphological and Cell Viability Properties for in-situ Skin Tissue Engineering Applications

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***Abstract*—**The present work deals with evaluation of printability properties and shape fidelity of honey-alginate bio-inks. Honey-alginate based bio-inks were prepared in different concentrations and 3D scaffolds were printed. The bio-inks were characterized for their viscosity which directly affected the printing fidelity of the scaffolds. The printed scaffolds were analysed for their physico-chemical, biological and mechanical properties. The presence of individual components was shown with the help of XRD and ATR-FTIR and characteristics. It was found that 1-2% honey ratio produced biopirinted scaffolds with improved cell-proliferation and printability. The mechanical strength was found to decrease with the increase in honey content whereas the cell viability was found to increase with the same. It was found that honey blending reduced alginate viscosity, which gradually affected bio-printing fidelity. Therefore, the concentration that provides for acceptable bio-printing along with improvement in cell proliferations is determined. It is concluded that honey blending improves cell response of alginate bio-inks and can be a facile approach to obtain bio-inks especially for in situ skin tissue engineering applications.

***Keywords*—**Bio-ink, Scaffold, 3D printing, Alginate, UTM, SEM.

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Factors That Hinder Ethnoracial Diversity in Los Angeles County from 2000-2016

Joseph F. Cabrera, Rachael Dela Cruz

***Abstract*—**This study specifically examines factors that hinder ethnoracially diverse neighborhoods. Ethnoracial diversity is important as it facilitates cross-racial interactions within neighborhoods which have been theorized to be associated with such outcomes as intergroup harmony, the reduction of racial and ethnic prejudice and discrimination, and increases in racial tolerance. Los Angeles (LA) is an ideal location to study ethnoracial spatial patterns as it is one of the most ethnoracially diverse cities in the world. A large influx of Latinos as well as Asians have contributed to LA's urban landscape becoming increasingly diverse over several decades. Our dataset contains all census tracts in Los Angeles County from 2000 to 2016, and incorporates Census and ACS demographic and spatial data. We quantify ethnoracial diversity using a derivative of Simpson's Diversity Index and utilize this measure to test previous literature that suggests Latinos are one of the key drivers of changing ethnoracial spatial patterns in Los Angeles. We also examine other demographic and spatial factors shown to be related to either declines or increases in neighborhood diversity. Preliminary results suggest that there has been an overall increase in ethnoracial diversity in Los Angeles neighborhoods over the past sixteen years. Patterns associated with this trend include decreases in predominantly white and black neighborhoods, increases in predominantly Latino and Asian neighborhoods, and a general decrease in the white populations of the most diverse neighborhoods. A similar pattern is seen in neighborhoods with large Latino increases- a decrease in white population, but with an increase in Asian and black populations. We also found support for previous research that suggests increases in Latino and Asian populations act as a buffer, allowing for black population increases without a sizeable decrease in the white population. These results support previous research suggesting that Latino population dynamics play a critical role in the decline of ethnoracially diverse neighborhoods. Future research is needed to understand the underlying causes involved in many of the patterns and trends highlighted in this study.

***Keywords*—**Race and ethnicity, diversity, interracial interaction, cross-racial interaction, racial tolerance.

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From Forked Tongues to Tinkerbell Ears: Rethinking the Criminalization of Alternative Body Modification in the UK

L. Hyett

***Abstract*—**The criminal law of England and Wales currently deems that a person cannot consent to the infliction of injury upon their own body, where the level of harm is considered to be Actual or Grevious. This renders the defence of consent of the victim as being unavailable to those persons carrying out an Alternative Body Modification procedure. However, the criminalization of consensual injury is more appropriately deemed as being categorized as an offense against public morality and not one against the person, which renders the State's involvement in the autonomous choices of a consenting adult, when determining what can be done to one's own body, an arbitrary one. Furthermore, to recognise in law that a person is capable of giving a valid consent to socially acceptable cosmetic interventions that largely consist of procedures designed to aesthetically please men and, not those of people who want to modify their bodies for other reasons means that patriarchal attitudes are continuing to underpin public repulsion and inhibit social acceptance of such practices.

Theoretical analysis will begin with a juridical examination of R v M(B) [2019] QB 1 where the High Court determined that Alternative Body Modification was not a special category exempting a person so performing from liability for Grevious Bodily Harm using the defence of consent. It will draw from its reasoning which considered that 'the removal of body parts were medical procedures being carried out for no medical reason by someone not qualified to carry them out' which will form the basis of this enquiry. It will consider the philosophical work of Georgio Agamben when analysing whether the biopolitical climate in the UK, which places the optimization of the perfect, healthy body at the centre of political concern can explain why those persons who wish to engage in Alternative Body Modification are treated as the 'Exception' to that which is normal using the 'no medical reason' canon to justify criminalisation, rather than legitimising the industry through regulation. It will consider, through a feminist lens, the current conflict in law between traditional cosmetic interventions which alter one's physical appearance for socially accepted aesthetic purposes such as those to the breast, lip and buttock and, modifications described as more outlandish such as earlobe stretching, tooth filing and transdermal implants to create horns and spikes under the skin. It will assert that ethical principles relating to the psychological impact of body modification described as 'alternative' is used as a means to exclude person's seeking such a procedure from receiving safe and competent treatment via a registered cosmetic surgeon which leads to these increasingly popular surgery's being performed in Tattoo parlours throughout the UK as an extension to other socially acceptable forms of self-modification such as piercings. It will contend that only by 'inclusive exclusion' will those 'othered' through ostracisation be welcomed into the fold of normality and this can only be achieved through recognition of alternative body modification as a legitimate cosmetic intervention, subject to the same regulatory framework as existing practice. This would assist in refocusing the political landscape by erring on the side of liberty rather than that of biology.

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***Keywords*—**Biopolitics, Body Modification, Consent, Criminal Law.

Ganoderma lucidum Is Able to Modulate Gene Expression in Human Cells Acting at Epigenetic Level: Preliminary Data

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Abstract—The aim of the present study was to investigate the effect of the medicinal fungus Ganoderma lucidum on human cells in vitro. This fungus has been used for a long time in the traditional medicine in East Asia (above all China and Japan). G. lucidum is believed to have medicinal properties and is used as a natural reinforce of the immune system and a remedy to control cholesterol, blood pressure, arrhythmia and diabetes beside many other diseases. Natural products based on this fungus are widely used as dietary supplements and as a tonic, but its therapeutic use is not officially recognized and, above all, the biological mechanisms triggered following its intake are largely unknown. Our study was carried out in vitro on the human CACO-2 cell line and the expression of micro RNAs (miRNAs) regulating functions related to effects that are ascribed to G. lucidum was searched in the presence and in the absence of lyophilized extract of the fungus (sporophore). The preliminary results showed that G. lucidum is able to influence gene expression through the modulation of miRNAs in a dose-dependent manner. The present data demonstrated that this fungus can influence the expression of miRNAs able to regulate cholesterol levels, blood pressure, and glucose resistance according to the knowledge of traditional medicine.

Keywords—Ganoderma lucidum, gene expression, human cells, miRNAs

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Identification of *Alternaria spp.* Associated with Anthracnose, Leafspot and the Role Mycotoxin Production on Pecans in South Africa

C. C. Achilonu, M. Gryzenhout, G. J. Marais

***Abstract*—**The pecan industry is growing at a significant rate in South Africa and is expected to expand in the next few years. This expansion is usually performed on lands previously used for other crops, or trees are cultivated on virgin soil. This opens the door for existing ecosystems to be disrupted and new interaction. Further, establishing living organisms such as microorganisms and insects which consequently causes diseases. However, anthracnose and leaf spot on pecan trees are diseases caused by *Alternaria* species; thus, collectively account for millions of rand's worth of damage annually. These diseases are associated with pecans in South Africa, and *Alternaria* spp. are regularly isolated from diseased material. Herein, we inoculated *Alternaria* spp. from pecan trees, which were healthy or had typical symptoms of leaf spot and anthracnose from the major pecan production areas. Subsequently, this study identified the *Alternaria* isolates using a multigene phylogenetic approach. Sequences, such as those of the Internal Transcribed Spacer (ITS), Glyceraldehyde 3-phosphate dehydrogenase (GAPDH), RNA Polymerase II subunit gene regions (RPB2), Translation-elongation factor 1α (Tef1), Alternaria major allergen gene (Alt a 1), Endopolygalactronase (EndoPG), and Anonymous gene (OPA10-2) gene regions, indicated that isolates from across South Africa grouped in the Alternaria alternata section. These include isolates obtained from both lesions and healthy tissue. This could make control of the fungi difficult, but keeping the pecan tree healthy through nutrition, water and agricultural practices could limit disease outbreaks.

***Keywords*—**Pecans, *Alternaria* spp., anthracnose, leafspot, Multi-gene phylogeny.

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Improving the Dielectric Strength of Transformer Oil for High Health Index: An FEM Based Approach Using Nanofluids

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***Abstract*—**As the world is moving towards extra-high voltage (EHV) and ultra-high voltage (UHV) power systems, the performance requirements of power transformers are becoming crucial to the system reliability and security. With the transformers being an essential component of a power system, low health index of transformers poses greater risks for safe and reliable operation. Therefore, to meet the rising demands of the power system and transformer performance, researchers are being prompted to provide solutions for enhanced thermal and electrical properties of transformers. This paper proposes an approach to improve the health index of a transformer by using nano-technology in conjunction with bio-degradable oils. Vegetable oils can serve as potential dielectric fluid alternatives to the conventional mineral oils, owing to their numerous inherent benefits; namely, higher fire and flash points, and being environment friendly in nature. Moreover, the addition of nanoparticles in the dielectric fluid further serves to improve the dielectric strength of the insulation medium.

In this research, using the finite element method (FEM) in COMSOL Multiphysics environment, and a 2D space dimension, three different oil samples have been modelled and the electric field distribution is computed for each sample at various electric potentials i.e., 90 kV, 100 kV, 150 kV and 200 kV. Furthermore, each sample has been modified with the addition of nanoparticles of different radii (50 nm and 100 nm) and at different interparticle distance (5 mm and 10 mm), considering an instant of time. The nanoparticles used are non-conductive and have been modelled as alumina (Al_2O_3). The geometry has been modelled according to IEC standard 60897, with a standard electrode gap distance of 25 mm. For an input supply voltage of 100 kV, the maximum electric field stresses obtained for the samples of synthetic vegetable oil, olive oil and mineral oil are 5.08×10^6 V/m, 5.11×10^6 V/m and 5.62×10^6 V/m, respectively. It is observed that for the unmodified samples, vegetable oils have a greater dielectric strength as compared to the conventionally used mineral oils because of their higher flash points and higher values of relative permittivity. Also, for the modified samples, the addition of nanoparticles inhibits the streamer propagation inside the dielectric medium and hence, serves to improve the dielectric properties of the medium.

***Keywords*—**Dielectric Strength, Finite Element Method, Health Index, Nanotechnology, Streamer Propagation.

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In vivo Mechanical Characterization of Facial Skin Combining Digital Image Correlation and Finite Element

Huixin Wei, Shibin Wang, Linan Li, Lei Zhou, Xinhao Tu

***Abstract*—**Facial skin is a biomedical material with complex mechanical properties of anisotropy, viscoelasticity and hyperelasticity. The mechanical properties of facial skin are crucial for a number of applications including facial plastic surgery, animation, dermatology, cosmetic industry and impact biomechanics. Skin is a complex multi-layered material which can be broadly divided into three main layers, the epidermis, the dermis and the hypodermis. Collagen fibres account for 75% of the dry weight of dermal tissue and it is these fibres which are responsible for the mechanical properties of skin. Many research on the anisotropic mechanical properties are mainly concentrated on in vitro, but there is a great difference between in vivo and in vitro for mechanical properties of the skin. In this study, we presented a method to measure the mechanical properties of facial skin in vivo. Digital image correlation (DIC) and indentation tests were used to obtain the experiment data, including the deformation of facial surface and indentation force-displacement curve. Then, the experiment was simulated using a finite element (FE) model. Application of Computed Tomography (CT) and reconstruction techniques obtained the real tissue geometry. A three-dimensional FE model of facial skin, including bi-layer system, was obtained. As the epidermis is relatively thin, the epidermis and dermis were regarded as one layer and below it was hypodermis in this study. The upper layer was modeled as an Gasser-Ogden-Holzapfel (GOH) model to describe hyperelastic and anisotropic behaviors of the dermis. The under layer was modeled as a linear elastic model. In conclusion, the material properties of two layer were determined by minimizing the error between the FE data and experimental data.

***Keywords*—**Facial skin, Indentation test, Finite element, Digital image correlation, Computed Tomography.

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Inference under the Coalescent with Recombination Using a New Data Structure

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Abstract—Inference under the coalescent with recombination has been a challenge in recent decades. Many different methods have been proposed to perform the inference. However, most of them struggle with more than a few kilobases of data, and none can handle the very large sample sizes we encounter today. One reason that these methods are not efficient for large sample sizes is because of the way they store and represent the genealogies, i.e., the data structure. All previous methods use the ancestral recombination graph (ARG) data structure in which each marginal tree is stored separately. Neighbouring trees in a genealogy share many parts and separately storing them leads to inefficiency in terms of time and storage. A key to gaining efficiency is taking into account these similarities. Recently, Kelleher et al. at 2016 proposed a new data structure called Tree Sequence Recording (TS) which is much more efficient than the ARG data structure. The source of the efficiency is in considering the similarities in consecutive trees of a genealogy. As shown in Kelleher et al. (2016), the TS is highly efficient in simulation. No attempt has been done to do inference under the coalescent with recombination using the TS. Using the TS, we tackle the inference problem; we propose an MCMC algorithm to conduct the inference.

Keywords—statistical genetics, the coalescent with recombination, ancestral recombination graph, population genetics

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Influence of International Business Exposure on Social Norms, Moral Intuitions and Moral Judgment in Chinese Adults

Cuizhu Wang

Abstract—It is widely supposed that globalization causes norm diffusion and changes in localized norms as communities are exposed to new patterns of normalized behaviour. These may include both social norms, and moral norm. Much of this diffusion plausibly occurs through international commercial relationships, and so might be expected to first be observable in the domain of business ethics. My PhD proposal is an empirical study which will investigate norm changes among Chinese business people who have participated in international commerce. The definition of 'social norm' and 'moral norm' in this project follows Bicchieri (2017), generalized by the formal 'conditional game theory' (CGT) model of Ross and Stirling (in preparation). I will analyse variations in the norms accepted in Chinese business contexts by conducting experiments comparing a control group of business people whose past commercial relationships have been domestic only with a group who have histories of involvement with international partners, suppliers, customers, or investors. My study will present subjects with a demographic questionnaire and elicitation of responses to vignettes, which are common methods in moral psychology. However, restriction to data obtained by these methods may yield bias due to subjects endeavouring to impress researchers, and/or to signal their own virtue to themselves. In hopes of generating unbiased data, I will introduce methodology from experimental economics, which attempts to control subjects' response incentives. I will elicit both risk preferences of subjects through lottery choices involving real cash payouts (following Harrison and Rutström 2008), and subjective beliefs about other subjects' responses to vignettes. These will be jointly estimated following the procedure of Harrison & Ulm (2015) and Harrison, Martínez-Correa, Swarthout, and Ulm (2017). The objective of this project is to: Identify and analyze implications of changes in norms in the internationally exposed groups, by reference to the control group; The subjects will be business people based in Shanghai (internationally exposed) and Hanzhong (control) which is a tier four city located in inland China. We predict that the Shanghai subjects will show some convergence toward international (Western) norms of business practice, and corresponding divergence from traditional Chinese norms, by comparison with the control group subjects. The thesis will conclude by considering implications for cultural stress and regulatory policy in China.

Keywords—Chinese business ethics, empirical study, moral psychology, norm change

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Intelligence in Immanuel Kant's Critique of Pure Reason: The System-Creating Principle and Source of Content for the Things in Themselves

Vladimir V. Suvorov

Abstract—In the Critique of Pure Reason, Immanuel Kant uses the concept of intelligence mainly in its traditional sense. However, one can find some peculiar clarifications in the Critique, that make his "intelligence" different from Anaxagoras' cosmic nous, the world of ideas by Plato and other theories, and interesting for contemporary research. In the Critique, the intelligence gains the status of a regulative principle, namely the idea of the highest being in concreto and the ideal of pure reason – "This ideal... is first realized... then hypostatized, and finally even personified; for the regulative unity of experience rests... hence the unity of the highest reality and... seems to lie in a highest understanding, hence in an intelligence". The regulative action of the intelligence implies the directing of reason towards the spontaneous creating of the representation of the results of cognition in a systematic unity. Kant explains – "It makes a big difference whether something is given to my reason as an object absolutely or is given only as an object in the idea". This means for the intelligence – "The concept of a highest intelligence is a mere idea... it is only a schema, ordered in accordance with... the greatest unity of reason... in that one derives the object of experience, as it were, from the imagined object of this idea as its ground or cause". Kant says – "The first object of such an idea is I myself, considered merely as thinking nature (soul)... Reason... makes out of it... the concept of a simple self-sufficient intelligence". Yet he also warns against making errors – "The idea of systematic unity should only serve as a regulative principle... Instead of this, one reverses... by grounding things hypostatically on the actuality of a principled of purposive unity... the concept of such a highest intelligence is determined anthropomorphically" Also Kant explains the meaning of the terms "intellektuelle" and "intelligible" in the Critique – "One must not use that of an intellectual world... for only cognitions are intellectual or sensitive... object... must be called intelligible or sensible". These terms refer to the human reason in a negative sense, that is, the content of such an object is incomprehensible to the human mind – "The intelligible would require an entirely special intuition, which we do not have, and in the absence of this would be nothing for us, though on the contrary appearances also cannot be objects in themselves". Following conclusions may be drawn: a) intelligence in the Critique can be interpreted as a system-creating (regulative) principle and b) by drawing an analogy between a thing in themselves and an intelligible object, it can be argued that the content of both is similar and belong to the scope of the intelligence. This interpretation is rather productive for the purposes of the conceptual model of "strong" artificial intelligence.

Keywords—intelligence, objects in themselves, regulative principle, system-creating principle

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Interpersonal Emotion Regulation in Adolescence: An Enhanced Critical Incident Study

Setareh Shayanfar

Abstract—Given the increasing importance of peer relationships during adolescence, the present study aimed to examine peer interactions that facilitate or hinder adolescents' regulation of negative emotions. Using the Enhanced Critical Incident Technique, 1-hour semi-structured interviews were conducted with 16 junior high school adolescents. Participants were asked to recall situations when they experienced strong negative emotions during the past school year, indicate the peer interactions that helped or hindered their emotion regulation, and identify prospective interactions with the potential to help regulate their emotions. Data analysis extracted 182 critical incidents, including 109 helping incidents, 45 hindering incidents, and 28 wish list items, which generated 10 categories nested within four overarching themes: Positive Personal Support included (a) supportive presence, (b) expressing concern, (c) empathizing, and (d) encouraging and cheering up; while Strategy Transmission included (e) sharing perspective, and (f) giving advice; Activated Support included (g) taking action, and (h) distracting; while Negative Personal Interactions included (i) withdrawing and (j) punishing. Implications for mental health and service providers, as well as recommendations for future research, are presented.

Keywords—adolescence, emotion regulation, enhanced critical incident technique, peers

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Kicking the Anthill: Understanding Terrorists' Cohesiveness and Influence in Africa

O. B. C. Nwankwo

Abstract—Understanding the practical configurations of the contemporary terrorist escapades in Africa is an important first step towards developing appropriate policies directed towards them. From the Maghreb through the Sahel to the Horn of Africa they are perceived to share common extreme ideology characterized by opposition to 'western cultural imperialism'. In spite of their invocation of the name of God, they care less about religion. With no common value or notion of right or wrong, they are part and parcel of the general struggle for power in the polity for the authoritative allocation of values in total disregard, however, of established framework. While debates on theoretical explanations may diverge from one another which this paper relying on secondary sources, intends first to explore, a common underlying trait is extreme violence towards the state and society to which the state responds with even greater violence. Against this background, and relying on secondary sources, the paper interrogates the contemporary state strategy which imposes heavy sanctions to curtail the incentive to undertake terrorist act. It argues that such zero sum game policies which focus on actual terrorists only reinforce terrorists' influence and lead to spiral in conflict. Relying on the benevolence theory of Frey and Leuchinger, the paper argues for a system which focuses on a mechanism that tends to produce a positive sum game among interacting parties as to contribute to peaceful political environment. To this end, the paper addresses the environmental conditions that foment radicalization and suggests strategies for dealing with them and thus cutting off the life blood of terrorism.

Keywords—anthill, benevolence, radicalisation, terrorism

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Large Eddy Simulations of Flow Dynamics in Unilaterally Paralyzed Vocal Folds

Swetha Chowdary Vutlapalli, Gábor Janiga, Samuel Voss

Abstract—Phonation is the process of voice production by the movement of vocal folds (VF) as the air flows through the upper respiratory tract (URT). Any abnormality in the movement (adduction or abduction) of VFs affects the voice quality. If, one of the VFs unable to move either temporarily or permanently results in unilateral vocal fold paralysis (UVFP). Due to the complex geometry, the flow inside URT is three-dimensional, unsteady and turbulent. Using realistic models in experimental studies is challenging in terms of model production and time needed. So, in this study large eddy simulations (LES) with the WALE sub-grid model is used to illustrate the flow dynamics in URT during inhalation mode with quasi-steady boundary conditions and 30 L/min volume flow rate. For this, a total of eight geometrical sets obtained from CT scan data are used. Power-loss, velocity fields and pressure drop factors are used for comparing models (1 model is healthy, 7 models with varying degree of UVFP). Development of flow features like the glottal jet, flow separation, and vortices are analyzed for increased flow rates. Because of increased constriction, the resistive losses significantly raised and breathing efficiency reduced.

Keywords—large eddy simulations, phonation, power-loss, unilateral vocal fold paralysis

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Material Detection by Phase Shift Cavity Ring-Down Spectroscopy

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***Abstract*—**Traditional optical methods for example resonance wavelength shift and cavity rig down spectroscopy used for material detection and sensing have disadvantages for example less resistance to laser noise ,temperature fluctuations and extraction of the required information can be difficult task like ring down time in case of cavity rig down spectroscopy. Phase Shift cavity rig down spectroscopy is not only easy to use but is also capable of overcoming the said problems. This techniques compares the phase difference between the signal coming out of cavity with the reference signal. Detection of any material is made by the phase difference between them. By using this technique, air, water and isopropyl alcohol can be recognized easily .This Methodology has far reaching applications and can be used in the air pollution detection, human breath analysis and many more.

***Keywords*—**Materials, Noise, Phase Shift, Resonance Wavelength, Sensitivity, Time Domain approach.

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Materials Characterization and Hydrogen Storage Capacity of MgNiCeCu Metallic Glasses

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***Abstract*—**Energy consumption for last decades significantly decreases the world's non-renewable sources and leads us to focus on unlimited sources of energy. Promising energy source is hydrogen with three times higher energy efficiency compared with nowadays use energy sources (oil, natural gas). Amorphous metallic glasses MgNiCe with various addition of Cu in structure substitute by Mg are studied for their high weight capacities of loaded hydrogen which present chemically bonded energy stored in amorphous structure. Storage of hydrogen in form of chemical bonding H-M pairs offers very safe and efficient storage method (maximal metal/hydrogen ratio in transition metal hydrides M/H=2). A group of Mg –based hydrides are promising storage carrier for their high hydrogen contain with maximal reversible capacity of 7,6 wt %. Magnesium melt-spun based alloy can obtained higher weight percentage of hydrogen as their crystalline forms, therefore study of amorphous metallic glasses is needed. Materials with chemical composition $Mg_{(70-x)}Ni_{20}Ce_{10}Cu_x$ (x=0, 5, 10, 15, 20) were prepared by three-step preparation procedure firstly by arc-melting to prepare pre-alloys used for second step of preparation to materials in form of metallic ribbons prepared by melt-spinning. Third part of preparation was activation by appropriate milling procedure. Various amount of Cu were selected for its low mixing enthalpy with hydrogen which effectively exhibits the desorption temperature comparable to $Mg_{70}Ni_{20}Ce_{10}$ atomic percent. For materials characterisation samples in form of ribbons were characterized by SEM, TEM, X-ray diffraction, DSC. Density, hardness and modulus of elasticity were obtained to describe the materials macroscopic properties. Thickness of prepared ribbons is ~40 μm and SEM shows the amorphous surface without oxides of Ce or Mg or components segregation. Investigation of hydrogen / deuterium storage capacity in materials were determined by thermogravimetric measurements in temperature range of 298-773 K and direct in situ measurements of mass difference with maximal absorption of hydrogen / deuterium of ~ 5.5 wt % at 393 K.

***Keywords*—**Hydrogen absorption, hydrogen storage materials, Magnesium-based amorphous alloys, melt-spun alloys.

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Materials for Electrically Driven Aircrafts: Highly Conductive Carbon-Fiber Reinforced Epoxy Composites

Simon Bard, Martin Demleitner, Florian Schönl, Volker Altstädt

***Abstract*—For an electrically driven aircraft, whose engine is based on semiconductors, alternative materials are needed. The avoid hotspots in the materials thermally conductive polymers are necessary. Nevertheless, the mechanical properties of these materials should remain. Herein, the work of three years in a project with airbus and Siemens is presented. Different strategies have been pursued to achieve conductive fiber-reinforced composites: Metal-coated carbon fibers, pitch-based fibers and particle-loaded matrices have been investigated. In addition, a combination of copper-coated fibers and a conductive matrix has been successfully tested for its conductivity and mechanical properties.**

First, prepregs have been produced with a laboratory scale prepreg line, which can handle materials with maximum width of 300 mm. These materials have then been processed to fiber-reinforced laminates.

For the PAN-fiber reinforced laminates, it could be shown that there is a strong dependency between fiber volume content and thermal conductivity. Laminates with 50 vol% of carbon fiber offer a conductivity of 0.6 W/mK, those with 66 vol% of fiber a thermal conductivity of 1 W/mK. With pitch-based fiber, the conductivity enhances to 1.5 W/mK for 61 vol% of fiber, compared to 0.81 W/mK with the same amount of fibers produced from PAN (+83% in conducitivity). The thermal conductivity of PAN-based composites with 50 vol% of fiber is at 0.6 W/mK, their nickel-coated counterparts with the same fiber volume content offer a conductivity of 1 W/mK, an increase of 66 %.

***Keywords*—Thermal conductivity, electric aircraft, carbon, polymer.**

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Mental Health Outcomes in Men with a History of Prostate Cancer Diagnosis

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Abstract—Prostate cancer patients with poor mental health report poorer treatment outcomes, decreased QOL, increased hospitalization rates and increased morality. According to the Canadian Community Health Survey, rates of mental health problems in the population range between 2.7% to 4.7%, while in the cancer populations, they range between 16% to 24%. While anxiety and depression is known to continue after cancer treatment, possibly for years, our understanding of the ramifications of prostate cancer treatment on the mental health of its survivors is still in its early stages. This study examined the burden of mental health issues in a population-based cohort of adult men with localized prostate cancer residing in one of three Maritime provinces in Canada and to evaluate associations with current urinary, sleep and intimacy/sexuality difficulties. A total of 258 men, who were 47 to 88 years of age (Median=69) with a history of clinically localized prostate cancer completed an on-line survey between 2017-2018, assessing patient reported multidimensional quality of life outcomes. The primary outcome of interest was a validated assessment of mental health disorder, Kessler Psychological Distress Scale (K10). Urinary problems were assessed using the International Prostate Symptom Score (I-PSS). Sleep and relationship difficulties were assessed using the Screening for Distress Questionnaire. A total of 16.3% men scored positive for mental health issues at the time the survey was completed. In this sample 17.1% of participants were currently on active surveillance, 82.9% reported having been treated with active treatment modalities (e.g., surgery, radiation, hormonal manipulation). Half of the sample (49.2%) reported mild urinary problems, 43.1% moderate and 7.7% severe urinary problems. The odds ratio was 4.33 times higher (95% CI: 1.87; 10.05) for screening positive for mental health problems among survivors with moderate to severe urinary problems compared with those with mild urinary problems. Odds ratios for screening positive for mental health problems among survivors with sleep problems and current worries about intimacy and sexuality were 2.97 (95% CI: 1.49; 5.91) and 2.32 (95% CI: 1.14; 4.69), respectively, compared with those with no sleep problems and intimacy and sexuality difficulties. Results indicate that men with severe urinary issues and those with sleep problems and intimacy and sexuality difficulties are at higher risk of having mental health problems after diagnosis and treatment of prostate cancer. Given that men diagnosed with localized prostate cancer have the highest 10 years survival rates, future research is needed to characterize the long-term impact of the various types of treatments (including combined forms of treatment and active surveillance) on men's physical, sexual and mental health function and their impact on daily life. Such assessments are critical to providing patient education, empowerment programs, and effective psychosocial interventions to support men on their prostate cancer journey.

Keywords—prostate cancer survivorship, mental health, quality of life, intimacy and sexuality

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Mercury Removal Using Polydopamine-Modified ZSM-5 Zeolite from Synthetic Effluents

Adriana Astudillo, Eddy Pazmiño

***Abstract*—**Mercury (Hg) is a dangerous pollutant which is very toxic for humans even at low concentrations in water (Hg^{2+}> 0.006 mg/L). Mercury affects the nervous and reproductive systems. In fact, Hg degrades DNA and increases through the food chain. In Southern Ecuador, several rivers are highly impacted by small and artisanal gold mining activity. It has been found that rivers close to the mining extraction areas of Ponce Enriquez, Portovelo-Zaruma and Nambija, the Hg concentration was 0.021; 0.1 and 0.025 mg/L, respectively. The most common practice for gold extraction in the region is via amalgamation, which typically requires 2 grams of Hg per each gram of gold extracted. This process generates tailings that in most cases are directly discharged in rivers. To reduce the Hg concentration, we have developed a zeolite ZSM-5 modified with polydopamine (PDA). Zeolites have operational and economic advantages, besides better mechanical and chemical properties than the polymer membranes. ZSM-5 zeolite was synthesized using a molar ratio of SiO_2 to Al_2O_3 of 80 via hydrothermal synthesis at 150 °C for 48 hours. PDA was synthesized directly in a zeolite suspension to obtain a 1% PDA in weight ZSM-5 zeolite. The polydopamine-modified ZSM-5 zeolite removed 99% of Hg from a 10 mg/L synthetic effluent in 2 hours at a pH 7.

***Keywords*—**Mercury, mining, ZSM-5, polydopamine.

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Method Validation and Estimation of Uncertainty for Some Honey Quality Parameters

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***Abstract*—**International Honey Commission (IHC) proposed methods for determining honey Quality parameters by different methods i.e. Sugars detection was carried out using HPLC Refractive Index, levels of Hydroxymethylfurfural HMF detection was evealuated by; two spectrophotometric methods after White or Winkler and HPLC method. Diastase activity was measured after Schade and with Phadebas. The aim of this study is to validate suitable methods for the simultaneous determination of 28 honey samples from the different botanical origins which were analyzed to prove the suitability of the methods for routine analysis of honey sugars by HPLC RI detection, HMF according to White and Diastase activity according to Schade. Methods were accredited form Egyptian accreditation center EGAC.

The described methods was verified with parameters e.g. repeatability, reproducibility, Precision, Linearity and Uncertainty budget, the "top -down" approach was used to estimate the sources of uncertainty.

Traceability of the measurement results was established based on the use of honey Proficiency Test PT sample (FAPAS PT 2827 sample) as suitable Certified Reference Material CRM and quality control sample(FAPAS QC 2827) provided by FAPAS. Also, CRM of both sugars and HMF are used. The method showed linearity (r= 0.9954 for Fructose, 0.9953 for Glucose and 0.9942 for Sucrose). Recovery was 101.3 % Fructose and 100 % Glucose, 106.7% Sucrose. The relative expanded uncertainties (k= 2) were 3.6 % for fructose, 3.6 % for Glucose, 9.7 % for Sucrose. The results for HMF concentration were in the range from 27.6 mg/kg to 28.3 mg/kg with an average of 27.9 and Repeatability Precision (RSDr) is 1.2%. While the results of diastase activity were in the range from 7.1 Diastase numbers DN to 7.4 DN with an average of 7.3 DN and Repeatability Precision (RSDr) is 1.4. The Recovery percentage was 101.3% for fructose and 100% for glucose, 106.7% for sucrose. Verification data showed the suitability of the procedure for routine analyses. It can be concluded that the described analytical procedures with established and evaluated uncertainty allow obtaining reliable and internationally comparable results suitable for routine analyses of honey quality.

***Keywords*—**Honey, Method Validation, Top down approach, HPLC-RI.

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Modelling the Effect of Alcohol Consumption on the Accelerating and Braking Behaviour of Drivers

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Abstract—Driving under the influence of alcohol impairs the driving performance and increases the crash risks worldwide. The present study investigated the effect of different Blood Alcohol Concentrations (BAC) on the accelerating and braking behaviour of drivers with the help of driving simulator experiments. Eighty-two licensed Indian drivers drove on the rural road environment designed in the driving simulator at BAC levels of 0.00%, 0.03%, 0.05%, and 0.08% respectively. Driving performance was analysed with the help of vehicle control performance indicators such as mean acceleration and mean brake pedal force of the participants. Preliminary analysis reported an increase in mean acceleration and mean brake pedal force with increasing BAC levels. Generalized linear mixed models were developed to quantify the effect of different alcohol levels and explanatory variables such as driver's age, gender and other driver characteristic variables on the driving performance indicators. Alcohol use was reported as a significant factor affecting the accelerating and braking performance of the drivers. The acceleration model results indicated that mean acceleration of the drivers increased by 0.013 m/s², 0.026 m/s² and 0.027 m/s² for the BAC levels of 0.03%, 0.05% and 0.08% respectively. Results of the brake pedal force model reported that mean brake pedal force of the drivers increased by 1.09 N, 1.32 N and 1.44 N for the BAC levels of 0.03%, 0.05% and 0.08% respectively. Age was a significant factor in both the models where one year increase in drivers' age resulted in 0.2% reduction in mean acceleration and 19% reduction in mean brake pedal force of the drivers. It shows that driving experience could compensate for the negative effects of alcohol to some extent while driving. Female drivers were found to accelerate slower and brake harder as compared to the male drivers which confirmed that female drivers are more conscious about their safety while driving. It was observed that drivers who were regular exercisers had better control on their accelerator pedal as compared to the non-regular exercisers during drunken driving. The findings of the present study revealed that drivers tend to be more aggressive and impulsive under the influence of alcohol which deteriorates their driving performance. Drunk driving state can be differentiated from sober driving state by observing the accelerating and braking behaviour of the drivers. The conclusions may provide reference in making countermeasures against drinking and driving and contribute to traffic safety.

Keywords—alcohol, acceleration, braking behaviour, driving simulator

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Modelling the Effect of Biomass Appropriation for Human Use on Global Biodiversity

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***Abstract*—**Due to population growth and changing patterns of production and consumption, the demand for natural resources and, as a result, the pressure on Earth's ecosystems are growing. Biodiversity mapping can be a useful tool for assessing species endangerment or detecting hotspots of extinction risks. This paper explores the benefits of using the change in trophic energy flows as a consequence of human alteration of the biosphere in biodiversity mapping. To this end, multiple linear regression models were developed to explain species richness in areas where there is no human influence (i.e. wilderness) for three taxonomic groups (birds, mammals, amphibians). The models were then applied to predict (I) potential global species richness using potential natural vegetation (NPPpot) and (II) global 'actual' species richness after biomass appropriation using NPP remaining in ecosystems after harvest (NPPeco). By calculating the difference between predicted potential and predicted actual species numbers, maps of estimated species richness loss were generated.

Results show that biomass appropriation for human use can indeed be linked to biodiversity loss. Areas for which the models predicted high species loss coincide with areas where species endangerment and extinctions are recorded to be particularly high by the International Union for Conservation of Nature and Natural Resources (IUCN). Furthermore, the analysis revealed that while the species distribution maps of the IUCN Red List of Threatened Species used for this research can determine hotspots of biodiversity loss in large parts of the world, the classification system for threatened and extinct species needs to be revised to better reflect local risks of extinction.

***Keywords*—**Biodiversity loss, biomass harvest, human appropriation of net primary production, species richness.

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Moral Foundation as a Determinant Factor of Public Mental Health

Imaduddin Hamzah

Abstract—This study aims to describe the moral foundation as a determinant of public mental health. This study uses a mental health explanation system as a moral character, which links mental health with the contribution of individual good and evil actions to society. During this time, the psychiatric perspective dominates the mental health concept that defines mental health as the absence of behavioral disorders, such as anxiety, affective disorders, and schizophrenia. This study uses the analysis of secondary data sourced from government institutions and other institutions with internet search. Psychology well-being indicators of public mental health use happiness index and moral foundation indicators consist of five components of behavior in society: harm/care, fairness/reciprocity, in-group/loyalty, authority/respect, and purity. The implications of this study provide consideration for the formulation of mental health policies that pay attention to increasing the moral foundation of individuals who can contribute to virtues in society.

Keywords—mental health, moral foundation, happiness index, psychology well being

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Morphological and Molecular Characterization of Macro Fungi from District Hunza, Gilgit- Baltistan, Pakistan

Abdul Razaq, Sabeela Shaheen, Imtiaz Ahmed Khan, Saleem Shahzad

Abstract—This article represents the detail of macro fungal species reported from District Hunza, Gilgit, Pakistan. The District of Gilgit- Baltistan represent a floristically rich area characterized mostly by moist and dry temperate forest with rich macro fungal diversity. The study was carried out from March to August of the study area. Planned field visits were arranged to the selected localities during which macro fungal species were collected and identified using macro and micro-morphological characters as well as molecular level. In this connection, DNA relies on standard molecular methodologies such as PCR amplification. The present study is first document attempt to estimate the genetic diversity of some important macro fungi from Gilgit-Baltistan using DNA based markers. During the study fourteen fungal species were using eleven Randomly Amplified Polymorphic (RAPD) DNA primers. Bivariate data was used to estimate the genetic diversity in the four fungal accessions using unpaired group of arithmetic mean (UPGMA) procedure. High level of genetic diversity ranging from 40% to 80 % was observed in the fungal species. The samples of accessions were also grouped in to 7 clusters using dendrogram analysis.

Keywords—macro fungi, genetic distance, basidiomycetes, ascomycetes, PCR, phylogeny, RAPD

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Nanoporous Activated Carbons for Fuel Cells and Supercapacitors

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***Abstract*—**Nowadays energy consumption constantly increases and development of effective and cheap electrochemical sources of power, such as fuel cells and electrochemical capacitors, is topical. Due to their high specific power, charge and discharge rates, working life time supercapacitor based energy accumulation systems are more and more extensively being used in mobile and stationary devices. Lignocellulosic materials are widely used as precursors and account for around 45% of the total raw materials used for the manufacture of activated carbon which is the most suitable material for supercapacitors.

First part of our research is devoted to study of influence of main stages of wood thermochemical activation parameters on activated carbons porous structure formation. It was found that the main factors governing the properties of carbon materials are specific surface area, volume and pore size distribution, particles dispersity, ash content and oxygen containing groups content. Influence of activated carbons attributes on capacitance and working properties of supercapacitor are demonstrated.

The correlation between activated carbons porous structure indices and electrochemical specifications of supercapacitors with electrodes made from these materials has been determined. It is shown that if synthesized activated carbons are used in supercapacitors then high specific capacitances can be reached – more than 380 F/g in 4.9M sulfuric acid based electrolytes and more than 170 F/g in 1 M tetraethylammonium tetrafluoroborate in acetonitrile electrolyte.

Power specifications and minimal price of H_2-O_2 fuel cells are limited by the expensive platinum-based catalysts. The main direction in development of non-platinum catalysts for the oxygen reduction is the study of cheap porous carbonaceous materials which can be obtained by the pyrolysis of polymers including renewable biomass. It is known that nitrogen atoms in carbon materials to a high degree determine properties of the doped activated carbons, such as high electrochemical stability, hardness, electric resistance, etc. The lack of sufficient knowledge on the doping of the carbon materials calls for the ongoing researches of properties and structure of modified carbon matrix.

In the second part of this study highly porous activated carbons were synthesized using alkali thermochemical activation from wood, cellulose and cellulose production residues – craft lignin and sewage sludge. Activated carbon samples were doped with dicyandiamide and melamine for the application as fuel cell cathodes. Conditions of nitrogen introduction (solvent, treatment temperature) and its content in the carbonaceous material, as well as porous structure characteristics, such as specific surface and pore size distribution, were studied.

It was found that efficiency of doping reaction depends on the elemental oxygen content in the activated carbon. Relationships between nitrogen content, porous structure characteristics and electrodes electrochemical properties are demonstrated.

***Keywords*—**Activated carbons, low-temperature fuel cells, nitrogen doping, porous structure, supercapacitors.

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New Experimental Analysis Method of Drop Pressure in Protective Grid Mesh in a Vertical Wind Tunnel

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***Abstract*—**The protective grid is used at the entrance of the flight area in order to prevent people from falling or modeling in the vertical wind tunnel. Due to the fact that the air flow speed is high in the flight area, the pressure drop in the protective grid will also be high. This pressure drop is about %27 of the total pressure drop across the wind tunnel. Multi-threaded wires are resistant to fatigue; hence protective grid wires are multi-threaded. In order to select the appropriate grid and related wires, a protective grid model was made and with using the wind tunnel, necessary researches were carried out. The results of the researches shown that the factor of protective grid pressure drop is strongly dependent on the ratio of open surface to the total surface of the grid. When this ratio is 0/95, the protective grid pressure drop is 0/06, when it decreases to 0/76, the protective grid pressure drop will increase to 0/37. Also, the factor of multi-threaded grid pressure drop and wiring grid is close to each other. For grids with a wire diameter of less than 0/6 mm, the results are consistent with the results of other researchers.

***Keywords*—**Protective grid, Pressure drop factor, Multi-threaded wire, Air flow rate distribution, Distribution of turbulence intensity.

I. Introduction

The low-speed wind tunnel can be divided into different types. One of the dividing methods is the vertical or horizontal wind tunnel. The vertical wind tunnel is used for testing such as airplane spin or parachuting freefall training. In order to prevent people from falling or simulation in the vertical wind tunnel, a protective grid is used in the channel of outlet nozzle or, in other words, inlet channel to flight area. Due to the fact that the air flow speed and therefore the dynamic pressure is at the highest level in the flight area, hence a lot of pressure drop occurs in this part of the wind tunnel. This pressure drop is likely to be about 27% to 36% of the total pressure drop of the wind tunnel [1]. Therefore, this pressure drop should be reduced. Grid pressure drop according to the equation of $\Delta P=kq$ is calculated that q is dynamic pressure and its amount depends on the speed of the air flow and its density. K is the grid pressure drop factor that depends on the size of the grid wire and its mesh number (number of holes per inch). Obviously, with the reduction of mesh number, the pressure drop caused from the grid is reduced. By reducing the mesh number, the distance between the grid wires is increased so there is a possibility for people's foot to get stuck in the grid, therefore it cannot be smaller than usual. The shape of the wire also has a great effect on reducing the post force and, consequently, reducing the pressure drop of the grid. The best design for a grid is a shape with a low post factor, this is the shape of the airfoil, but according to its usage in the grid, there is the possibility of changing the angle of attack, and as a result, its post force rises sharply, therefore, it is not appropriate for use. So, it is necessary that the grid wire be symmetrical, which is the only symmetric cross section of the circle.

Another usage of the grid is its application in the laminar wind tunnel room [2]. This type of mesh is a common mesh and it's aimed to reduce the severity of the axial airflow turbulence. The mechanism of this kind of grid is that the vortices in the air stream, which are larger than the hole of the mesh, would crash after crossing the mesh and divide into smaller vortices [3]. These small vortices disappear at the downstream of the mesh. For this reason, the mesh number of these grids is large and is about 17 to 26, while the protective mesh is about 0/5 or less. In association with the pressure drop and the effect of common mesh on reducing the severity of turbulence, wide researches have been carried out by various researchers in recent years. Wieghardt and et al. [4] (The common pressure drop factor of the grid is expressed as a function of open surface ratio to the total grid and Reynolds number and determined its semi-experimental equations. Also, Devahl-Davis and et al. [5] presented other Semi-experimental equations for the pressure drop of a common grid according to Reynolds number and ratio of open surface to the total surface area. Prandtl [6], Dryden and et al. [7] presented Semi-experimental equations which expresses the intensity of the turbulence of the air flow speed reduction by the grid. They showed that the reduction of the intensity of turbulence has a reverse ratio with the grid pressure drop factor. Ardakani and et al. [8] reviewed the airflow downstream of multi-threaded wire by using the hot-wire flow meter experimentally. For Reynolds numbers higher than 9600, Post force factor of Multi-threaded wires is close to wires.

As mentioned before Protective grid in comparison with common grid has small mesh number (number of its holes is low in one inch) and in the other words the ratio of open grid area to its total area is high, so its pressure drop factor depends on other parameters like grid wire type and

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Newton Raphson, Line Search Newton and Trust Region Methods in Aircraft Trim: A Comparative Study

Murat Millidere, Samet Uslu

***Abstract*—**While analyzing an air vehicle, it is not possible to use the nonlinear model directly without appropriate initial conditions. No linear control approaches are available as well. The linearized models are required for the design of control laws. In order to obtain a linear model, the nonlinear model must be linearized about an appropriate point. Appropriate point stands for a point about which trim condition must not change abruptly. So the point refers trim condition. Trim condition could be defined as a condition in which the derivatives of the states in the equations of motion are set to zero. This results in that states would not change with time.

In this paper, Newton-Raphson method will be used firstly in order to find a trim condition. Trim calculation problem reduces to solving a system of nonlinear algebraic equations in the Newton-Raphson method. Nonlinear equations in engineering are solved by linearizing the equations and forming various iterative procedures. For strongly nonlinear problems, the solution obtained in the iterative process can diverge due to numerical instability. When the starting point is remote from a solution, Newton Raphson algorithm behave erratically. Sometimes, components of the unknown inputs and states or the Jacobian will blow up. Global convergence was addressed, which is the issue of trying to force convergence to a solution from remote starting point. The Newton-Raphson method can be made more robust by using line search and trust-region techniques. In this study comparative study is done by incorporating different methods for solving the nonlinear equations in aircraft trimming.

The trim algorithms allow us to specify different flight maneuvers, e.g., steady state straight horizontal flight, climbing and turning flight with the implementation of several constraints or more complex case like steady heading sideslip as well. With just changing the constraints and dependent input and state variables and independent state derivative and output variables, the trim algorithm can be adjusted for any type of maneuver at prescribed speed, altitude and climb angle and cg position. The trim algorithms are demonstrated using F16 model in the literature.

***Keywords*—**Aircraft Trim, Line Search Newton Method, Newton Raphson Method, Trust Region Method.

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On the Mathematical Representation of Slope-Infiltration

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***Abstract*—**Partitioning of rainfall at the soil-atmosphere interface is important for both surface and subsurface hydrology, and influences many events of major hydrologic interest such as runoff generation, aquifer recharge, and transport of pollutants in surface waters as well as the vadose zone. This partitioning is achieved through the process of infiltration that has been widely investigated at the local scale, and more recently also at the field scale, by models that were designed for horizontal surfaces. However, infiltration, overland flows, and deep flows in most real situations are generated by rainfall over sloping surfaces that bring in additional effects. Therefore, existing models for local infiltration into homogeneous and layered soils and those as for field-scale infiltration, have to be adapted to account for the effects of surface slope. Various studies have investigated the role of surface slope on infiltration based on a theoretical formulations for the dynamics of infiltration, extensions of the Green-Ampt approach, and from laboratory and field experiments.

However, conflicting results have been reported in the scientific literature on the role of surface slope on infiltration. More specifically, there is growing laboratory evidence that the reduction in infiltration occurs beyond the theoretical cos γ factor expected during steady saturated conditions. This is especially prominent for infiltration over bare slopes and for clay soils, and becomes less prominent for vegetated surfaces and sandy soils. When studies have reported an apparent increase in infiltration, this has perhaps been due to the formation of a sealing layer, or because of some complications introduced through rill formation. Experiments that were designed to eliminate these effects have reinforced this behavior of increased infiltration beyond what is expected from a cosine of the slope angle.

Here, to provide an explanation for the experimental results, we suggest an original physical abstraction of the involved processes.

***Keywords*—**Hillslope hydrology, overland flow, infiltration process, infiltration modeling.

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Optimal Scheduling in Cloud Computing Environment Using the Bee Algorithm

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***Abstract*—Cloud computing has made a fundamental change in the way of strange information and data and implementation of application progress. Everything is hosted on a cloud that is a set of several servers and computer, which can be accessed through the internet instead of placing data and application programs on a personal computer. The challenges of cloud computing system are dedicating the resources to the system requests. Dedicating resources to the requests is an NP-complete problem due to requests and resource dynamics. In recent year, one of the most important and promising methods to solve such problems is innovating methods inspired by nature. These methods are similar to the social or natural system. In this article, we want to use the honeybee colony algorithm for resources scheduling. This algorithm is an optimization method based on swarm intelligence and intelligent behavior of the honeybee population. Honeybee algorithm involves a group based on the search algorithm.**

***Keywords*—Cloud computing, scheduling, resource dedication, honeybee algorithm.**

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Optimized Communication Method in Aviation Industry with Climatic Functions Updated for More Safety

F. Heidari, N. Valizadeh, Y. Valizadeh

***Abstract*—**Different types of communication already has long been used and proposed as serious and special items in the most appearance of human repercussion, which considered to be the large intercommunity factor in aerospace and aviation incidents and accidents. During old level of aviation communication. It was imaged the sky was too huge and free and it was impossible to hit or make accidents two aircraft or airplane. One package o internet protocol communication systems (IPCS) used to keep these possibilities close to zero. By updating of early aviation communication system and applying simulating internet protocol communication system, the aeronautical and aviation staff in whole world presented the geniuses and talents in establishing an efficient and promoted infrastructure strong network especially for the combination of telecommunication and computer industry by final version of data link application (DLA). Using IPSP protocol for management telecommunication safely and benefit of this transferring system has been investigated. Role of boundary condition in the avionics system analyzed and presented good suggestion for using optimized communication equipped devices. Given the widespread use of IPS technology in the ACARS network, ATN infrastructure, as well as future global aviation programs, such as NextGen and SESAR, its expansion is expected to continue to accelerate.

***Keywords*—**Aviation Communication, internet protocol communication systems, Roadmap Aviation Safety, AID system.

I. Introduction

Different types of communication already has long been used and proposed as a serious and special items in most appearance of human repercussion, which considered to be the large intercommunity factor in aerospace and aviation incidents and accidents [1]. Given the widespread use of IPS technology in the ACARS network, ATN infrastructure, as well as future global aviation programs, such as Next Gen and SESAR, its expansion is expected to continue to accelerate.

Communication error and miscommunication may occur between pilots and also between pilots and airplane controller [2]. Different kind of miscommunication can occur including:

- Quantity of information and data
- Clear and transparent accent and pronunciation
- Miscommunication and misunderstanding

Effective communication is one of the elementary human necessity and in aviation and aerospace industry an essential prerequisite to more safety [3]. In radiotelephone and wireless communication study and estimation, it was achieved more than 75% of RTF transmission by aeronaut and pilots were wrong in different direction. Obviously this guys are not only loop and case from this vital and crucial important chain and there are another records comes from airlines traffic documentation as well [4]:

- Almost 35% of accidents and improper have miscommunication protocol system, increase to 55% in airport and flight platform sites.
- 28% of all different dangerous level accidents had basic miscommunication
- Root cause of 43% accidental injury in runway invasion and violation was aviation communication mistake.

In the early generations of aircraft navigation, equipment such as ground lanterns, horizontals, or magnets were used. Pilots spent a lot of time on the flight path to determine their location and to determine the route to the airport. But with the advent of radio navigation equipment and its expansion, pilots' workload dropped dramatically [5]. Using this equipment, it was possible for the pilot to determine the position in any circumstances from day and night [6]. On the other hand, the use of radio systems to steer the aircraft accurately to the landing runway severely reduced air accidents. The ILS system is simply said to be a system that allows pilots to safely drop off by sending radio waves even when their landing strips are not readily visible [7] , [8].

II. Aviation Communication Methods

A. Miscommunications

Because of bold role of miscommunication in aviation communication algorithm, the internet protocol system package (IPSP) which often known as TCP/IP was created to stablish and perform the infrastructure of an efficient and strong network telecommunication and wireless communication industry. The success using this protocol in commercial sector, it has also made this protocol possible to benefit from it in aviation industry [9]. Recently Iran has plans to lunch different kind of projects for introduction of IPSP into aviation system and

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Orange Leaves and Rice Straw on Methane Emission and Milk Production in Murciano-Granadina Dairy Goat Diet

Tamara Romero, Manuel Romero-Huelva, José V. Segarra, José Castro, Carlos Fernández

***Abstract*—**Many foods resulting from processing and manufacturing end up as waste, most of which is burned, dumped into landfills or used as compost, which leads to wasted resources, and environmental problems due to unsuitable disposal. Using residues of the crop and food processing industries to feed livestock has the advantage to obviating the need for costly waste management programs. The main residue generated in citrus cultivations and rice crop are pruning waste and rice straw, respectively. Within Spain, the Valencian Community is one of the world's oldest citrus and rice production areas. The objective of this experiment was find out the effects of including orange leaves and rice straw as ingredients in the concentrate diets of goats, on milk production and methane (CH4) emissions.

Ten Murciano-Granadina dairy goats (45 kg of body weight, on average) in mid lactation were selected in a crossover design experiment, where each goat received two treatments in 2 periods. Both group were fed with 1.7 kg pelleted mixed ration; one group (n= 5) was a control (C) and the other group (n= 5) used orange leaves and rice straw (OR). The forage was alfalfa hay, and it was the same for the two groups (1 kg of alfalfa was offered by goat and day). The diets employed achieve the requirements during lactation period for caprine livestock. The goats were allocated to individual metabolism cages. After 14 days of adaptation, feed intake and milk yield were recorded daily over a 5 days period. Physico-chemical parameters and somatic cell count in milk samples were determined. Then, gas exchange measurements were recorded individually by an open-circuit indirect calorimetry system using a head box. The data were analyzed by mixed model with diet and digestibility as fixed effect and goat as random effect. No differences were found for dry matter intake (2.23 kg/d, on average). Higher milk yield was found for C diet than OR (2.3 vs. 2.1 kg/goat and day, respectively) and, greater milk fat content was observed for OR than C (6.5 vs. 5.5%, respectively). The cheese extract was also greater in OR than C (10.7 vs. 9.6%). Goats fed OR diet produced significantly fewer CH4 emissions than C diet (27 vs. 30 g/d, respectively).

These preliminary results (LIFE Project LOWCARBON FEED LIFE/CCM/ES/000088) suggested that the use of these waste by-products was effective to reducing CH4 emission without detrimental effect on milk yield.

***Keywords*—**Agricultural waste, goat, milk production, methane emission.

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Perception of Risk toward Traffic Violence among Road Users in Makassar, Indonesia

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***Abstract*—**Traffic violence is currently a big issue in Indonesia. However, the road users perceived risk that is caused by traffic violence is low. The lack of safety driving awareness is one of the factor that road users committed to traffic violence. There are several lists of common traffic violence in Indonesia such as lack of physical fitness, not wearing helmet, unfasten seatbelt, breaking through the traffic light, not holding driving license, and some more violence. This research sought to explore the perception of road users toward traffic violence. The participants were road users in Makassar, Indonesia who were using cars and motorbikes. The method of the research was qualitative approach by using personal interview to collect data. The research showed that there three main ideas of perceiving traffic violence which are motives, environment that supported traffic violence, and reinforcement. The road users committed traffic violence had particular motive, for example, rushing. The road users committed to traffic violence when other road users and significant other did the same. The road users committed traffic violence when the police was not there to give a ticket. It can be concluded that perception of road users toward traffic violence determined by internal aspect, social aspect, and regulation.

***Keywords*—**Perception, road users, traffic, violence.

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Phytoextraction of Copper and Nickel Contaminated Soils by *Salix schwerinii*

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***Abstract*—**Soils are contaminated with copper (Cu) and nickel (Ni) due to various activities, such as specific industrial processes, or the long-term disposal of wastes, such as sewage sludge, landfill waste products, pesticides and coal combustion. Phytoextraction, such as short rotation based green engineering, could be an alternative to the harsher cleanup technologies. A pot experiment was conducted for 150 days, to evaluate *Salix schwerinii* competency in terms of growth, biomass production and metals uptake in copper (Cu) and nickel (Ni) contaminated soils collected from a landfill area in Finland. Peat soil was added at different quantities to the polluted soil to stimulate plant growth. The plants were irrigated with tap water or processed water (municipal waste water) to further investigate the effects of nutrient loading on plant biomass growth. The soil was treated at two pH levels (4 and 6). The method (EPA 3052) developed by environmental protection agency (EPA) was used to determine the extractable Cu and Ni concentration. The results showed that the addition of 30–60% peat soil at pH 6 to a polluted soil, and irrigation with processed water accelerated plant growth and phytoextraction efficiency. In the study, *Salix* grown in Cu and Ni -contaminated field soil were unaffected by the contaminated soil and took up excess nutrients from the soil and water. Total mean Cu concentration ranged from 10 to 220 mg kg^{-1} and mean Ni concentration ranged from 12 to 77 mg kg^{-1}. Under the different treatments, Cu (18 to 55 %) and Ni (8 to 25 %) were taken up by *Salix*. Results revealed that *S. schwerinii* has the potential to accumulate significant amounts of Cu and Ni.

***Keywords*—**Landfill, Phytoextraction, Peat soil, *Salix*.

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Preliminary Characterization of Hericium Species Sampled in Tuscany, Italy

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***Abstract*—**Fungi of the genus Hericium contain various compounds with antibacterial activity, cytotoxic effect on cancer cells and bioactive molecules. Some of the active metabolites stimulate the synthesis of the Nerve Growth Factor (NGF). Recently, the effect of dietary supplement based on Hericium erinaceus on recognition memory and on hippocampal mossy fiber-CA3 neurotransmission was published. The aim of this study was to investigate the presence of Hericium species on Italian territory in order to isolate the strains for further studies and applications. The first step was to collect Hericium sporophores in Tuscany: H. alpestre Pers., H. coralloides (Scop.) Pers. and H. erinaceus (Bull.) Pers. were the species present. The strains of H. alpestre (H.a.1), H. coralloides (H.c.1) and H. erinaceus (H.e.1 & H.e.2) have been isolated in pure culture and preserved in the collection of the University of Pavia (MicUNIPV). The DNA sequences obtained from the strains were compared to other sequences found in international databases. Therefore, it was possible to construct a phylogenetic tree that highlights the clear separation in clades of the sequences and the molecular identification of our strains with the species of Hericium considered. The second step was to cultivate indoor and outdoor H. erinaceus in order to obtain as many sporophores as possible for further chemical analysis. All the procedures for H. erinaceus cultivation have been followed. Among the available recipes for indoor H. erinaceus cultivation, it was used a substrate formulation contained 70% oak sawdust, 20% rice bran, 10% wheat straw, 1% CaCO3 and 1% sucrose. The bioactive compounds present in the mycelia and in the sporophores of H. erinaceus were chemically analyzed in collaboration with the Centro Grandi Strumenti of the University of Pavia using high-performance liquid chromatography/electrospray ionization tandem mass spectrometry (HPLC/ESI-MS/MS). The materials to be analyzed were previously freeze-dried and then extracted with an alcoholic procedure. Preliminary chromatographic analysis revealed the presence of potentially bioactive and structurally different secondary metabolites such as polysaccharides, erinacins, ericenones, steroids and other terpenoids. Ericenones C and D (in sporophores) and erinacin A (in mycelium) have been identified by comparison with the respective standards. These molecules are known to have effects on Central Nervous System (CNS) cells, which is the main objective of our studies. Thanks to the high sensitivity in the detection of bioactive compounds of H. erinaceus, it will be possible to use the To obtain liophilized mycelium and the respective culture broth, 4 small pieces (about 5 mm2) of the respective H.e.1 or H.c.1 strains, taken from the margin of growing cultures (MEA), were inoculated into 1 liter of 2% ME (malt extract, Biokar Diagnostics). The static liquid cultures were kept at 24 °C in dark chamber and fungi grew for one month. 10 replicates for each strains have been done.method proposed as an analytical screening protocol to determine the optimal growth conditions of the fungus and to improve the production chain of H. erinaceus. These results encourage to carry out chemical analyzes also on H. alpestre and H. coralloides in order to evaluate the presence of bioactive compounds in these two species.

***Keywords*—**Hericium species, Hercium erinaceus bioactive compounds, medicinal mushrooms, mushroom cultivation.

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PX-80 Shock Initiation Characteristics Based on Large Scale Gap Test Experimental Setup

Roy Ceder, Valentin Ognev, Gershon Klimintz, Rina Oldek, Vitaly Leus

Abstract—Shock initiation of explosives has been at the focus of many important studies. Over the years, research in this field has been advanced along two main routes. One research direction consists of assessing the critical conditions, under which a shock wave succeeds or fails in initiating a high explosive. For this purpose, various shock initiation experimental tests have been developed, among which is the common large scale gap test (LSGT). An alternate direction pursued, consists of quantitatively measuring properties associated with shock to detonation transitions (SDT). One such SDT characteristic is the run to detonation distance and its dependence on the input pressure. In order to understand these results, various numerical ignition and growth models have been developed. The success of these models in reproducing run distance experimental results, for a vast variety of explosives, has made them a common tool for obtaining insights concerning SDT. In this paper, we aim to explore a combination of the two approaches mentioned above. Using the LSGT experimental setup, we conduct a series of measurements of the run distances for different lengths of the gap partition. We then analyze these results numerically with hydrocode simulations, using an ignition and growth model. We perform this study with the high explosive PX-80, which is the Israeli explosive equivalent of PBXN-110.

Keywords—detonation, shock initiation, explosives, gap test

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Reduction of Plants Biodiversity in Hyrcanian Forest by Coal Mining Activities

Mahsa Tavakoli, Seyed Mohammad Hojjati, Yahya Kooch

***Abstract*—**Considering that coal mining is one of the important industrial activities, it may cause damages to environment. According to the author's best knowledge, the effect of traditional coal mining activities on plant biodiversity has not been investigated in the Hyrcanian forests. Therefore, in this study, the effect of coal mining activities on vegetation and tree diversity was investigated in Hyrcanian forest, North Iran. After filed visiting and determining the mine, 16 plots (20×20 m^2) were established by systematic-randomly (60×60 m^2) in an area of 4 ha (200×200 m^2-mine entrance placed at center). An area adjacent to the mine was not affected by the mining activity, and it is considered as the control area. In each plot, the data about trees such as number and type of species were recorded. The biodiversity of vegetation cover was considered 5 square sub-plots (1 m^2) in each plot. PAST software and Ecological Methodology were used to calculate Biodiversity indices. The value of Shannon Wiener and Simpson diversity indices for tree cover in control area (1.04±0.34 and 0.62±0.20) was significantly higher than mining area (0.78±0.27 and 0.45±0.14). The value of evenness indices for tree cover in the mining area was significantly lower than that of the control area. The value of Shannon Wiener and Simpson diversity indices for vegetation cover in the control area (1.37±0.06 and 0.69±0.02) was significantly higher than the mining area (1.02±0.13 and 0.50±0.07). The value of evenness index in the control area was significantly higher than the mining area. Plant communities are a good indicator of the changes in the site. Study about changes in vegetation biodiversity and plant dynamics in the degraded land can provide necessary information for forest management and reforestation of these areas.

***Keywords*—**Vegetation biodiversity, species composition, traditional coal mining, caspian forest.

I. Introduction

DESPITE the fact that mining is one of the most important industrial activities in the world, it has many environmental impacts [1]. One of the most important environmental effects of coal mining is the production of residues; because these residues contain heavy metals such as cadmium (Cd) and lead (Pb) [2]. This pollution source represents the risk for both the human populations and for vegetation cover in an ecosystem [3], [4].

Mining activities can change the plant structure and biodiversity and removal of vegetation [5]. Mining activities usually affect relatively small areas of vegetation, but loss of species diversity due to erosion may be significant [6]. Loss of plant diversity can affect the ecosystem functions [7]. Negative effects of coal mining on plants have been reported in recent studies [8].

Hyrcanian forest located in the north of Iran (covers the southern coasts of the Caspian Sea and is expanding over the northern slopes of the Alborz Mountains), and this forest is a suitable habitat for many hardwood (e.g. beech, oak, maple, alder) [9], [10]. The Hyrcanian forests are an essential source of genetic variation, biodiversity as well as various environmental services and benefits such as wildlife habitat. However, some of human activities (e.g. traditional coal mining) have led degradation of Hyrcanian forest [11].

To our knowledge, there has not yet been a study about the effect of traditional coal mining on forest ecosystem especially on plant biodiversity in the Hyrcanian forests. The purpose of this study was to reveal the effects of coal mining on vegetation and tree diversity in Hyrcanian forest of north Iran for the first time. Study about plant diversity in degraded areas could be a good solution for rehabilitation and management of these areas.

II. Materials And Method

A. Site Description

The study was conducted in Lavij Forest, western Hyrcanian forests, Noor City, Mazandaran Province, Iran (Fig. 1). The natural forest vegetation is temperate deciduous forests containing broad-leaved species such as beech (*Fagus orientalis* Lipsky), oak (*Quercus castaneifolia* C. A. M), hornbeam (*Carpinus betulus* L.), maple (*Acer velutinum* Boiss., *Acer cappadocium* Gled.). The elevation range is about between 950-1270 m. The average slope is 30%, and the main aspects are West and South-west. The climate is temperate humid and meteorological data provided by synoptic meteorological station indicated that annual average rainfall is 866 mm. Mean annual temperature is 9.8 °C. The soil type is brown forest soil, and the permeability and stability of bedrock are very weak and has drift conditions [12].

B. Experimental Design

In this study, after visiting and determining the location of the mine, 16 plots (20 × 20 m^2) were established systematic-randomly (a 60 × 60 m grid) in an area of 4 ha (200×200 m^2), in the way that mine entrance placed at center [13], [14] (Fig. 1). Then, an area adjacent to the mine, which was not affected by the mining activity (approximately 2 Km distances), was selected and considered as the control area and plots were established with the mentioned method. In each plot, the

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Risk Assessment for Metro Rail Projects: Indian Case Scenario

Reddhi Uday Bhatt, Reshma Shah

Abstract—Metro system provides connectivity, giving rise to an efficient system of transportation. It is prevalent in major cities across the world. They are capital intensive projects and an integral part of the public transport system. In case of such important projects, the stakes are higher. In the project lifecycle namely the following phases – pre-construction, during construction, post construction; comprising of the project. For each phase the there are various risk factors giving rise to complications. These risks have a direct impact on the project schedule, cost, and performance. Identification of the issues and challenges faced for development of a metro project has been carried out, considering the cases studies the significant factors are analyzed. Mitigation measures adopted the risks identified through various stages have been studied and recommendations are provided.

Keywords—identification, issues, mitigation, risk factors

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Road User Perception toward Current Road Safety Programs Implementation (5 Pillars): A Case Study in Makassar, Indonesia

Syahrul Alim, Musawwir

***Abstract*—**Traffic accident is one of the highest causes of death in the world. According to data from World Health Organization, every day around 786 road users die. Meanwhile, traffic accident in Indonesia is no less worrying, where every hour around 2 people are victims of accident. One of the metropolitan city that contributed to the highest number of traffic accident is Makassar. Around 907 cases of traffic accident occurred during the first 6 months of 2018. One of the reason comes from the human error factor such as traffic violation. It often occur because of road user ignorance traffic safety rules.

The aims of this study is to understanding the road user perception on current road safety programs implementation, The Five Pillars (Road Safety Management; Safer Roads and Mobility; Safer Vehicles; Safer Road Users; Post-crash Management) that have been declared internationally by World Health Organization and also have been conducted in Indonesia to actualize safe mobility & zero accident. An understanding of driving safety correlates with traffic compliance so that it is expected to reduce the number of traffic violations which then reduce the number of traffic accident.

The data collected by qualitative method, in particular case study approach. Two groups of respondent (motorbike and car users) of productive age interviewed in-depth to reveal their perceptions about current road safety which referencing The Five Pillars program as a guideline of driving safety. A good understanding of road user perceptions of traffic safety rules, will be a feedback for the government to provide needed solution like spread more intense and sustainable safety program socialization.

***Keywords*—**Driving safety, five pillars implementation, road safety program, road user perceptions, traffic accident.

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Role of Traditional and Cultural Graphical Communication in Business and Marketing Industry

Z. Ghorbani, M. B. Sahrady

***Abstract*—**The dominance and influence of the new media which is mainly through the software Image, font and common theme is increasing, although promising similar visual language for easier communication but this similarity always has some risks like marginalizing or to forgetting various world-wide visual cultures. In Iran, these dangers have also occurred due to the lack of content continuity and Iranian visual elements in various fields, such as the distortion of the city's image, the disappearance of ancient memorable patterns and the replacement of strange elements in urban space. These concerns has caused governmental and non-governmental organizations emphasize on various topics such as Iranian identity, the use of Iranian images and cultural elements, production of Iranian content in the visual field in order to cope with these visual effects. Graphic communication, based on a greater understanding of existing data, helps users to increase the amount of efficiency in the assessment of information. And play an effective role in public relations. The purpose of this study was to investigate the role of graphic communication and informational graphic media in generating a new style of content and transferring knowledge by public relations and its role in attracting messages by public relations audiences. In this study researchers pay attention to Iranian Visual identity in order to rebuild the old pattern and bringing it closer to the contemporary pattern and the graphic principles and rules are used for this. The visual identity of Iran graphically is divided into two branches of Iranian general visual identity and Iranian organizational visual identity. Approved symbols and symbols like flag and other official signs of the country that their application has certain rules also are in this area. An Iranian graphic work should be a reminder of Iranian visual culture and this study express this subject with a quality orientation.

***Keywords*—**Identity, visual culture, Iranian Art, graphic.

I. Introduction

Subject of this study are considered about parallel and other non-coherent topics in the areas of communication, identity Iranian culture and etc. in graphic field this topic has always been combined with pictorial connections and has its own opponents. One of the main problems of identity and communication in graphics is about disagreement on the subject of identity in graphic or its elements. Advantage of this research subject is that the communication and identity topic have been studied in detail and are considered according to triple Graphic Communication Functions. From a graphical point of view, the research questions are as follows:

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What is Iranian visual identity?

What is the identity role in Graphic Communication and the real meaning expression?

It will be reminded that the images and visual evidence of this research have been taken from different pictorial fields.

Expression of the subject/ subject statement

According to Iranian rich visual background culture and available evidence and despite the general request there is no endeavor to preserve and propagate this heritage and to update it. Uncertainty of purpose and disagreement on naming topics, Temporary efforts and a series of these inconsistencies clarify an effort has been made to maintain, develop and promote Iranian visual culture according to the circumstances of the day and the importance of graphic communication in this study. This research focuses mainly on the subject of graphical communication, regardless of any Side Effects or previous challenges.

Theoretical aspects

Symbolic theories are used to study the role of graphics and create visual communication structures. The summary of this theory is as follows:

All signs and values must be approved first and used again. In this research the globalization of myths and graphic values, that each of them has a cultural identity, and their role in graphic communication, have been checked. Relying on this theory, It seems that the preservation and development of visual and graphic signs about the subject of Iranian visual identity and cultural communications has led to the development and strengthening of its upper field which is Iranian cultural identity.

Research method

The present research is presented in a descriptive and analytical way with deductive reasoning and using evidence and examples from library resources and scientific and news databases, and also with the help of experience and knowledge of this paper authors.

Importance and necessity of research subject

To illustrate the necessity of this research, Bordio [1] cultural theory has been used. In Bordio opinion, culture is a kind of economy or market, in which four types of capital will be exchanged by its participant. Capital is a symbol of respect, personality and individual capabilities, which the main focus of graphical communications are based on them. The theory of cultural capital is derived from the educational graphics system, which reflects the respect for government culture. According to the author's thought, the research on the role of graphic communication is a step towards strengthening Cultural Capital of Iranian Civilization .

The division of graphical communication with the orientation of Iranian visual identity is as follows:

1- Application, re-creation and Strengthening Iranian visual signs while identifying and further

Roles of Nurse Manager for Team Nursing in Geriatric Health Service Facilities (GHSFs) in Japan

Chiharu Miyata, Hidenori Arai

***Abstract*—Background:** The characteristics of geriatric health service facilities (GHSFs) includes provision of care focused on the life of the users, and there is a need for cooperation with the care workers and physical therapists responsible for the care. Thus, it is expected that a nurse manager should have specific roles suited for the above characteristics different from those of medical facilities. However, very little research has dealt with the role and management expected for the nurse manager of GHSFs. Thus, by questionnaire survey for nurses and care workers in GHSFs.

Objectives: The purpose of this study was to clarify the role expectation of nurse managers in GHSFs.

Method: We used a descriptive, cross-sectional method. The study was conducted in 56 GHSFs all over Japan. The instrument used for data collection was a questionnaire about the role of nurse managers in GHSFs. The role of nurse managers was analyzed using principal factor analysis.

Results: A total of 282 nurses and care workers participated in this study. Using the responses to these 35 questions related to the role of nurse managers we performed a factor analysis (main factor method: promax rotation). As a result, we extracted 34 items, which were classified into three factors (propulsion of home nursing, management of medical care, environment creation for collaboration and education) for nurses. In case of care worker, four factors consisting of 33 items were extracted. Factors one, two and three consisted of the items similar to those of nurses, and "Intervention to ethical problem" was extracted as factor four in addition to them. The role expectation of nurse managers in GHSFs has been clarified in which the characteristics of GHSFs are reflected. Threfore, they should have a viewpoint of the management different from that of the medical treatment facilities.

***Keywords*—Role of nurse manager, geriatric health service facilities, staff nurses, care workers.**

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Safety Assessment: Probabilistic Analyzes of a Breakwater on Soft Clay

Ana Luiza R. V. Oliveira, Alberto S. F. J. Sayão

Abstract—During the construction of a port terminal on Sergipe North coast, Northeast of Brazil, the failure of a breakwater slope happened. The breakwater was over a sand layer overlapping 8 meters of soft clay. After gathering laboratory test results and porepressure measurements from piezometers installed in the soft clay, it has been developed probabilistic studies of the breakwater stability. The probabilistic studies motivation relies on the fact that in geotechnical scenario, the parameters are considered very variable. This work presents the comparison between probabilistic and deterministic methods when evaluating the breakwater safety. The deterministic analyzes used limit equilibrium methods consecrated in the geotechnical field and literature: Janbu Simplified (1973), Spencer (1967) e Morgenstern-Price (1965). The probabilistic methods presented in this work are the most studied in geotechnical problems, and it is necessary only basic understanding about statistics and probabilistics concepts; therefore, the calculation of a reliability index instead of factor of safety proves to be easier and more practical to apply during geotechnical projects. The methods presented here are: First Order Second Moment, Point Estimates and Monte Carlo Simulation. All of these approaches present similar results among each other. However, the First Order Second Moment Method allows to identify those parameters that influence most on the probability of failure, which brings simplicity and additional information to the probabilistic analyzes. In addition, this work presents also the comparison between two different scenarios: total stress analyzes (using undrained behavior to the soft clay) and effective stress analyzes (using effective friction angle and excess porepressure acting on the soft clay). The scenario which represents better the field behavior in order to estimate the factor of safety and the probability of failure in soft clay construction is the total stress. The general conclusion is that the greater the number of tests and monitoring instruments, more accurate the parameters values are. It contributes to a reliability index value closer to the real situation.

Keywords—Effective stress analysis, probability of failure, reliability index, total stress analysis

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Sentiment Analysis of Tourist Online Reviews Concerning Lisbon Cultural Patrimony, as a Contribute to the City Attractiveness Evaluation

J. Ferreira do Rosário, M. Calisto, A. Machado, N. Gustavo, R. Gonçalves

***Abstract*—**The tourism sector is increasingly important to the economic performance of countries and a relevant theme to academic research, increasing the importance of understanding how and why tourists evaluate tourism locations. The city of Lisbon is currently a tourist destination of excellence in the European and world-wide panorama, registering a significant growth of the economic weight of its tourist activities in the Gross Added Value of the region. Although there is research on the feedback of those who visit tourist sites and different methodologies for studying tourist sites have been applied, this research seeks to be innovative in the objective of obtaining insights on the competitiveness in terms of attractiveness of the city of Lisbon as a tourist destination, based the feedback of tourists in the Facebook pages of the most visited museums and monuments of Lisbon, an interpretation that is relevant in the development of strategies of tourist attraction.

The intangible dimension of the tourism offer, due to its unique condition of simultaneous production and consumption, makes eWOM particularly relevant. The testimony of consumers is thus a decisive factor in the decision-making and buying process in tourism.

Online social networks are one of the most used platforms for tourists to evaluate the attractiveness's points of a tourism destination (e.g. cultural and historical heritage), with this user-generated feedback enabling relevant information about the customer-tourists. This information is related to the tourist experience representing the true voice of the customer. Furthermore, this voice perceived by others as genuine, opposite to marketing messages, may have a powerful word-of-mouth influence on other potential tourists.

The relevance of online reviews sharing, however, becomes particularly complex, considering social media users' different profiles or the possible and different sources of information available, as well as their associated reputation associated with each source.

In the light of these trends, our research focuses on the tourists' feedback on Facebook pages of the most visited museums and monuments of Lisbon that contribute to its attractiveness as a tourism destination. Sentiment Analysis is the methodology selected for this research, using public available information in the online context, which was deemed as an appropriate non-participatory observation method. Data will be collected from two museums (Museu dos Coches and Museu de Arte Antiga) and three monuments ((Mosteiro dos Jerónimos, Torre de Belém and Panteão Nacional) Facebook pages during a period of one year.

The research results will help in the evaluation of the considered places by the tourists, their contribution to the city attractiveness and present insights helpful for the management decisions regarding this museums and monuments. The results of this study will also contribute to a better knowledge of the tourism sector, namely the identification of attributes in the evaluation and choice of the city of Lisbon as a tourist destination.

Further research will evaluate the Lisbon attraction points for tourists in different categories beyond museums and monuments, will also evaluate the tourist feedback from other sources like TripAdvisor and apply the same methodology in other cities and country regions.

***Keywords*—**Lisbon tourism, Opinion mining, Sentiment analysis, Tourism location attractiveness evaluation.

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Shared Neural Mechanisms during Committing and Observing an Error: An EEG Hyperscanning Study

Pal Czobor, Brigitta Kakuszi, Mate Baradits, Hasan Cagin-Lenk, Istvan Bitter

Abstract—Background: The ability to monitor one's own and others' mistakes is crucial for social interactions. Electrophysiological studies identified two event related potential (ERP) components as neural responses to error-commission: the error-related negativity (ERN), which is associated with an early automatic error-detection process; and the subsequent error-positivity (Pe) which is associated with conscious error-signaling. These studies focused on elucidating the neural responses to self-committed errors. The few studies that examined error processing in social contexts found that the neural basis of processing others' and one's own errors show an overlap. However, the scope of these studies was limited, as they examined only the early error processing stage; we found no study that investigated error-positivity. Objective: To examine whether the neural mechanisms associated with self-generated errors are also elicited by the observation of errors committed by others during the later phase of error processing, as reflected by the Pe. Methods: We examined the monitoring of one's own and others' mistakes in an EEG-hyperscanning experiment. Besides ERN, the Pe component was also investigated in a Go/NoGo task using pictures from International Affective Picture System as stimuli. We recorded high-density EEGs from 18 pairs of subjects, using two 256-channel BioSemi ActiveTwo amplifiers. For each pair, the EEG-sessions were divided into two conditions. In the first condition, one of the participants (Actor) had to respond to every stimulus presentation while withholding responses of any stimulus repeated in a row. The other member of the pair (Observer) monitored the Actor's responses on a separate computer screen. In the second condition, the roles of the members of the pair were reversed. Results: We found that both the early autonomous and the late conscious error signaling-related ERP activity, as reflected by the ERN and Pe, respectively, were modulated in both the Actor and the Observer by the correctness the responses. Specifically, observation of the other person's errors elicited ERN and Pe components that were similar in topographical distribution to those that were elicited by self-committed errors, but significantly ($p<0.05$) smaller with respect to their amplitude. Conclusions: Our findings support the idea of a generic error-processing mechanism, which plays a role both in monitoring one's own and other people's actions. Neurobiological insights into the detection and mirroring of each others' errors offers important clinical applications since the inability to detect and process the occurrence of errors has been found to have transdiagnostic significance across a wide-range of psychiatric disorders.

Keywords—error-processing, error-related ERPs, hyperscanning, observing and committing an error

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Social Media Influence and Ecotourism Destination Image: Understanding Empowering Social Participation through the Mediation Role of Social Influence

I. Putu Gede Iwan Trisna Jaya

Abstract—Local communities as one entity of the tourism system, is the most party influenced positively or negatively by the tourism activities in their region. Considered to have better understanding of their region, this paper aimed to study empowering local social participation through social influence in the development of ecotourism at Kintamani Bali. The sample of study is native and have been living in Kintamani at least for 10 years with the sample size of 185 respondent. Respondents are selected based on convenience sampling technique. Data processed and analyzed the structural equation model (SEM) with Partial Least Square (PLS) software. The result showed that social media influencer, destination image, and social influence have a positive and significant influence on social participation. Social influence from the local community has successfully to be greater effect as mediation for social media influence for social participation in ecotourism compared to the destination image. However, the total effect of destination image through mediation of social influence a combination of its direct and indirect effects has a bigger effect for social participation in ecotourism sustainability at the district of Kintamani Bali.

Keywords—destination image, social media influencer, social influence, social participation

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Social Support Leads Resiliency from Traumatic Road Accident in Makassar, Indonesia

Sulasmi Sudirman, Wahyuliani Safitri Ibrahim

***Abstract*—**Road accident is one of traumatic event that people can experience. The number of road accident in Indonesia is increasing. The more transport vehicles and the more road accident happened. The purposed of the research was to explore how social support can lead resiliency from traumatic road accident in Makassar-Indonesia. The participants of the research were the people who have experienced road accident. The research method was qualitative approach by using personal interview. The research showed that the road accident that participants have experienced was considered as traumatic event. The respondents stated that supports from significant others could help them to try to drive again. It can be concluded that social support such as informational support, material support, emotional support, and recognition support are leading people to recover from traumatic road accident.

***Keywords*—**Resiliency, social support, road, accident.

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Studies on the Characterization and Machinability of Duplex Stainless Steel 2205 during Dry Turning

Gaurav D. Sonawane, Vikas G. Sargade

***Abstract*—**The present investigation is a study of the effect of advanced Physical Vapor Deposition (PVD) coatings on cutting temperature residual stresses and surface roughness during Duplex Stainless Steel (DSS) 2205 turning. Austenite stabilizers like nickel, manganese, and molybdenum reduced the cost of DSS. Surface Integrity (SI) plays an important role in determining corrosion resistance and fatigue life. Resistance to various types of corrosion makes DSS suitable for applications with critical environments like Heat exchangers, Desalination plants, Seawater pipes and Marine components. However, lower thermal conductivity, poor chip control and non-uniform tool wear make DSS very difficult to machine. Cemented carbide tools (M grade) were used to turn DSS in a dry environment. AlTiN and AlTiCrN coatings were deposited using advanced PVD High Pulse Impulse Magnetron Sputtering (HiPIMS) technique. Experiments were conducted with cutting speed of 100 m/min, 140 m/min and 180 m/min. A constant feed and depth of cut of 0.18 mm/rev and 0.8 mm were used, respectively. AlTiCrN coated tools followed by AlTiN coated tools outperformed uncoated tools due to properties like lower thermal conductivity, higher adhesion strength and hardness. Residual stresses were found to be compressive for all the tools used for dry turning, increasing the fatigue life of the machined component. Higher cutting temperatures were observed for coated tools due to its lower thermal conductivity, which results in very less tool wear than uncoated tools. Surface roughness with uncoated tools was found to be three times higher than coated tools due to lower coefficient of friction of coating used.

***Keywords*—**Cutting temperatures, DSS2205, dry turning, HiPIMS, surface integrity.

I. Introduction

STAINLESS steel family is having four members as Austenitic (ASS), Ferritic (FSS), Martensitic (MSS) and DSS. Nickel shortage due to the Korean War resulted in more concentration being given to low-nickel duplex alloy steels [1]. The lower percentage of alloying elements like Ni and Mo, which is replaced by austenite stabilizers like nitrogen, makes them a cheaper alternative with more superior mechanical and corrosion resistant properties [2].

Balanced phases of austenite and ferrite in DSS provide better chloride Stress Corrosion Cracking (SCC) resistance than single phase materials like ASS. DSS has served in construction of marine machinery and structures [3]. SS316L was the most famous option for the marine industry. But due to the limitation of poor resistance to SSC and lower strength to weight ratio, DSS are widely used for duplex chemical tankers carrying molasses, fish oil lubricants and methanol. The marine industry also employ DSS for steering propellers, water jet engines, thrusters, propeller shafts and other applications where high mechanical loads are subjected.

Different alloying elements allows DSS to provide versatile properties but on other side makes it more difficult to machine. Higher nitrogen and molybdenum content make DSS machining difficult even when coated carbide tools are used. Uncontrolled flow of chips may cause chipping of coating and tool material on flank face [4], [5]. Nilsson [3] and Voronenko [6] in their reviews reported that though DSS has higher strength, low carbon content and absence of nonmetallic inclusions are the main reasons for poor machinability. Two phase structure results in separate regions with different hardness. Modification in the surface characteristics of tools is proved to be the basic requirement, while machining materials having low machinability. DSS machining with higher cutting speeds results in tool plastic deformation with coating flaking and frittering [1]. If machined at lower speeds, DSS have a basic issue of built-up layer (BUL).

Wet cutting comes with several advantages, but on the other hand, the use of coolants is questioned due to environment issues and operator health in long-term machining. Disposal of the coolant after use is also a big concern as it may lead to the pollution of soil and water [7]. All these issues lead to eliminate the use of cutting fluids and promote dry cutting to improve productivity. Dry cutting demands the improved surface properties of cutting tools. Among the coating techniques used for hard coatings, PVD is preferred over chemical vapour deposition (CVD). This is because of advantages lower deposition temperature, fine grain microstructure of PVD and due to higher deposition temperature, higher stresses and embrittlement in the later. Because of the small grain size, movement of dislocation is restricted and also as the number of grain boundaries are more, the crack development possibility minimal [8], [9]. Hard coatings reduce abrasive wear resulting in improvement in wear resistance. High power impulse magnetron sputtering (HiPIMS) is the recent advancement in PVD technology. Kulkarni et al. [4] reported better performance of HiPIMS over cathodic arc evaporation while dry turning. Researchers have reported almost 60-70% of increase in tool life while machining in dry conditions [10]. Moreover, the use of chip breaker is recommended for machining DSS to avoid BUL formation, which is not found to be advantageous in wet cutting. Researchers have estimated that the cost of use of

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Supersonic Flow around a Dihedral Airfoil: Modeling and Experimentation Investigation

A.Naamane; M.Hasnaoui

***Abstract*—** Numerical modeling of fluid flows, whether compressible or incompressible, laminar or turbulent presents a considerable contribution in the scientific and industrial fields. However, the development of an approximate model of a supersonic flow requires the introduction of specific and more precise techniques and methods. For this purpose, the object of this paper is modeling a supersonic flow of inviscid fluid around a dihedral airfoil. Based on the thin airfoils theory and the non-dimensional stationary Steichen equation of a two-dimensional supersonic flow in isentropic evolution, we obtained a solution for the downstream velocity potential of the oblique shock at the second order of relative thickness that characterizes a perturbation parameter. This result has been dealt with by the asymptotic analysis and characteristics method. In order to validate our model, the results are discussed in comparison with theoretical and experimental results. Indeed, firstly, the comparison of the results of our model has shown that they are quantitatively acceptable compared to the existing theoretical results. Finally, an experimental study was conducted using the AF300 supersonic wind tunnel. In this experiment, we have considered the incident upstream Mach number over a symmetrical dihedral airfoil wing. The comparison of the different Mach number downstream results of our model with those of the existing theoretical data (relative margin between 0.07% and 4%) and with experimental results (concordance for a deflection angle between 1° and 11°) support the validation of our model with accuracy.

***Keywords*—** Asymptotic modelling, dihedral airfoil, supersonic flow, supersonic wind tunnel.

I. Introduction

THE Supersonic flows are frequently encountered in many fields of application. Indeed, many aerospace applications are concerned regular by highly compressible flows (aircraft, spaceship, missile ...). In general, all these flows are very complex, despite, for simple geometries involving straight and oblique shocks, detachments and attachments and strong interactions between shock waves and boundary layers…. For these studies, several resolutions have been adopted based on numerical simulation or experimental measurements [1,2]. The numerical modeling of supersonic flow around the airfoils has been the topic of wide research, in the engineering applications [3]. The combination of analytical and numerical methods is conceivable by study of chaotic motions [4].

Others studies interested to local existence and the uniqueness of weak shock solution in steady supersonic flow past a wedge [5]. An analytical solution for the generation of shock wave obtained a result of supersonic flow around a wedge [6]. Others methods are deployed to study the supersonic flow profile: the method of hydraulic analog simulation (the method of gas-hydraulic analogy) [7] and simulation using both continuum and particle approaches with inter-molecular collision modeling [8].

In this work, we use asymptotic methods to develop a model of a supersonic flow around thin wing airfoil. Then, we employ an application on the dihedral airfoil and an experimental study to validate the developed model.

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II. Problem Formulation

Taking into account the Bernoulli integral and the slip-condition, for a compressible, isentropic, and irrotational Eulerian fluid flow, and in a two-dimensional steady-state case, we obtain the **non-dimensional** Steichen Equation, namely:

$$\begin{aligned}&(M_\infty^2-1)\frac{\partial^2\varphi}{\partial x^2}-\frac{\partial^2\varphi}{\partial z^2}\\&+\varepsilon M_\infty^2\left\{(\gamma+1)\frac{\partial\varphi}{\partial x}\frac{\partial^2\varphi}{\partial x^2}+(\gamma-1)\frac{\partial\varphi}{\partial x}\frac{\partial^2\varphi}{\partial z^2}+2\frac{\partial\varphi}{\partial z}\frac{\partial^2\varphi}{\partial x\partial z}\right\}\\&+\varepsilon^2 M_\infty^2\left\{[\frac{\gamma+1}{2}(\frac{\partial\varphi}{\partial x})^2+\frac{\gamma-1}{2}(\frac{\partial\varphi}{\partial z})^2]\frac{\partial^2\varphi}{\partial x^2}\right.\\&\left.+[\frac{\gamma+1}{2}(\frac{\partial\varphi}{\partial z})^2+\frac{\gamma-1}{2}(\frac{\partial\varphi}{\partial x})^2]\frac{\partial^2\varphi}{\partial z^2}+2\frac{\partial\varphi}{\partial x}\frac{\partial\varphi}{\partial z}\frac{\partial^2\varphi}{\partial x\partial z}\right\}=0\end{aligned} \quad (1)$$

Where M_∞ is the characteristic far upstream Mach number, $\varphi(x,z)$ is the velocity potential around the body, γ is a constant with the value 1.40 for dry air and ε characterizes a perturbation parameter.

We obtained (1) after the linearization of non-dimensional Steichen Equation about the particular solution, far upstream of an obstacle, as:

$$u=1+\varepsilon\frac{\partial\varphi}{\partial x} \quad ; \quad w=\varepsilon\frac{\partial\varphi}{\partial z} \quad (2)$$

Where $u(x,z)$ and $w(x,z)$ are the velocity components.

The steady-state Steichen (1) is hyperbolic equation. But, the signal speed of disturbances is finite in compressible flow.

According to the ***"Least Degeneration Principle"***, of keeping the maximum terms in (1) and consequently a lot of information, the dimensionless equation of fluid flow around a profile in the (x, y) plane is :

$$z=\varepsilon f(x) \quad ; \quad x\in[0,1] \quad (3)$$

The relation (1) shows that the flow perturbation is caused

Supporting Moral Competence with the Konstanz Method of Dilemma Discussion: Presentation of the Method and It's Possible Applications

Malgorzata Stec

***Abstract*—**Most methods of stimulating moral development are based exclusively on supporting moral thinking. The development of thinking is not the same as the development of the skills necessary for participation in a democratic society. Thinking supports action, but action does not end with thinking. The concept of moral competence (ability) includes cognitive and emotional elements, as well as components related to attitudes and applicable practical skills. The Konstanz Method of Dilemma Discussion (KMDD®) proposes the stimulation of moral competence based on all of these elements in the practice of discussion, taking into account the principles that create an ideal environment for learning cooperation, tolerance, and finally what can be called a moral-democratic competence. It is difficult to speak only about morality in the context of social life. Morality based on a democratic model is inclusive, open to cooperation, the sharing of common values and norms as well as the joint determination of solutions and ideas during the discussion. Moral competence is indispensable for common deliberation and reflection based on the assessment of not only the people but the internal quality of the arguments they propose. The KMDD® method was created by Prof. Georg Lind from the University of Konstanz in Germany who is a direct student of Lawrence Kohlberg. KMDD® is the result of a polemic with Kohlberg's proposal for fostering moral development by using moral dilemma discussions. Many years of research on the KMDD® method and taking care of its high quality have resulted in the creation of a method of evaluating its effectiveness which is the MCT® test (*Moral Competence Test*). It enables a decision on the basis of repeated measurements (pretest and post-test) regarding to what extent the method produces the desired results in a given group and - which is vital - a check as to whether KMDD® is effective in a certain educational context in comparison with other methods. The Konstanz Method of Dilemma Discussion is used successfully in many countries around the world and brings reliable and significant results (also high *αES*), which are also very persistent. What is more, the very strict KMDD®-Teacher's certification procedure allows only the best users with the most experience to become teachers of the method. It is responsible for the high quality of KMDD® among other methods of a similar kind. This presentation aims to bring the Konstanz Method of Dilemma Discussion (KMDD®) closer to different specialists from different fields (e.g. teachers, educators, psychologists, philosophers) as well as to show how the KMDD® method can enrich the practice of supporting the moral development of an individual.

***Keywords*—**Dilemma discussion, KMDD®, moral competence, moral development.

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System-Driven Design Process for Integrated Multifunctional Movable Concepts

Oliver Bertram, Leonel Akoto Chama

Abstract—In today's civil transport aircraft, the design of flight control systems is based on the experience gained from previous aircraft configurations with a clear distinction between primary and secondary flight control functions for controlling the aircraft altitude and trajectory. Significant system improvements are now seen particularly in multifunctional moveable concepts where the flight control functions are no longer considered separate but integral. This allows new functions to be implemented in order to improve the overall aircraft performance. However, the classical design process of flight controls is sequential and insufficiently interdisciplinary. In particular, the systems discipline is involved only rudimentarily in the early phase. In many cases, the task of systems design is limited to meeting the requirements of the upstream disciplines, which may lead to integration problems later. For this reason, approaching design with an incremental development is required to reduce the risk of a complete redesign. Although the potential and the path to multifunctional moveable concepts are shown, the complete re-engineering of aircraft concepts with less classic moveable concepts is associated with a considerable risk for the design due to the lack of design methods. This represents an obstacle to major leaps in technology. This gap in state of the art is even further increased if, in the future, unconventional aircraft configurations shall be considered, where no reference data or architectures are available. This means that the use of the above-mentioned experience-based approach used for conventional configurations is limited and not applicable to the next generation of aircraft. In particular, there is a need for methods and tools for a rapid trade-off between new multifunctional flight control systems architectures. To close this gap in the state of the art, an integrated system-driven design process for multifunctional flight control systems of non-classical aircraft configurations will be presented. The overall goal of the design process is to find optimal solutions for single or combined target criteria in a fast process from the very large solution space for the flight control system. In contrast to the state of the art, all disciplines are involved for a holistic design in an integrated rather than a sequential process. To emphasize the systems discipline, this paper focuses on the methodology for designing moveable actuation systems in the context of this integrated design process of multifunctional moveables. The methodology includes different approaches for creating system architectures, component design methods as well as the necessary process outputs to evaluate the systems. An application example of a reference configuration is used to demonstrate the process and validate the results. For this, new unconventional hydraulic and electrical flight control system architectures are calculated which result from the higher requirements for multifunctional moveable concept. In addition to typical key performance indicators such as mass and required power requirements, the results regarding the feasibility and wing integration aspects of the system components are examined and discussed here. This is intended to show how the systems design can influence and drive the wing and overall aircraft design.

Keywords—actuation systems, flight control surfaces, multi-functional movables, wing design process

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Systematic Analysis of Immune Response to Biomaterial Surface Characteristics

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***Abstract*—**Introduction: The immune response plays a major role in implant biocompatibility, but an understanding of how to design biomaterials for specific immune responses is yet to be achieved.

Objectives: We aimed to better understand how changing certain material properties can drive immune responses. To this end we tested immune response to experimental implant coatings that vary in specific characteristics.

Materials and methods: A layer-by-layer approach was employed to vary surface charge and wettability. Human-based *in vitro* models (THP-1 macrophages and primary peripheral blood mononuclear cells (PBMCS)) were used to assess immune responses using multiplex cytokine analysis, flow cytometry (CD molecule expression) and microscopy (cell morphology).

Results: We observed dramatic differences in immune response due to specific alterations in coating properties. For example altering the surface charge of coating A from anionic to cationic resulted in substantial elevation of the pro-inflammatory molecules IL-1beta, IL-6, TNF-alpha and MIP-1beta, while the pro-wound healing factor VEGF was significantly down-regulated. We also observed changes in cell surface marker expression in relation to altered coating properties, such as CD16 on NK Cells and HLA-DR on monocytes. We furthermore observed changes in the morphology of THP-1 macrophages following cultivation on different coatings. A correlation between these morphological changes and the cytokine expression profile is ongoing.

Conclusion: Targeted changes in biomaterial properties can produce vast differences in immune response. The properties of the coatings examined here may therefore be a method to direct specific biological responses in order to improve implant biocompatibility.

***Keywords*—**Biomaterials, coatings, immune system, implants.

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Teachers as Agents of Change in Diverse Classrooms: An Overview of the Literature

Anna Sanczyk

***Abstract*—**Diverse students may experience different forms of discrimination. Some of the oppression students experience in schools are racism, sexism, classism, or homophobia that may affect their achievement, and teachers need to make sure they create inclusive, equitable classroom environments. The broader literature on social change in education shows that teachers who challenge oppression and want to promote equitable and transformative education face institutional, social, and political constraints. This paper discusses research on teachers' work to create socially just and culturally inclusive classrooms and schools. The practical contribution of this literature review is that it provides a comprehensive compilation of the studies presenting teachers' roles and efforts in affecting social change. The examination of the research on social change in education points to the urgency of teachers addressing the needs of marginalized students and resisting systemic oppression in schools. The implications of this literature review relate to the concerns that schools should provide greater advocacy for marginalized students in diverse learning contexts, and teacher education programs should prepare teachers to be active advocates for diverse students. The literature review has the potential to inform educators to enhance educational equity and improve the learning environment. This literature review illustrates teachers as agents of change in diverse classrooms and contributes to understanding various ways of taking action towards fostering more equitable and transformative education in today's schools.

***Keywords*—**Agents of change, diversity, oppression, social change.

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Teachers' Perceptions and Experiences of Their Teaching Practices Regarding Daily Living Skills for Students with Intellectual and Developmental Disabilities in Singapore

M. Chen, Levan Lim

Abstract—Many individuals with intellectual and developmental disabilities (IDD) often display deficits in independent daily living skills (Domire & Wolfe, 2014; Jacobson & Ackerman, 1990; Kraijer, 2000). Obtaining a clear picture of teachers' perceptions and experiences of their teaching practices regarding daily living skills for students with IDD in Singapore would be instrumental for us to understand their current teaching practices, the challenges they are encountered with, the existing beliefs they are holding, and the training they may need in terms of teaching daily living skills. Using a qualitative research methodology, one-to-one interviews were conducted with 10 special education teachers. Data were transcribed and analyzed in terms of teachers' definition of daily living skills, the priorities in their selection of daily living skills, the teaching practices they used, and challenges they have encountered. Limitations and implications are further discussed.

Keywords—intellectual and developmental disability, daily living skill, teacher perception, qualitative research methodology

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Technical Sustainable Management: An Instrument to Increase Energy Efficiency in Wastewater Treatment Plants, a Case Study in Jordan

D. Winkler, L. Koevener, L. AlHayary

***Abstract*—**This paper contributes to the improvement of the municipal wastewater systems in Jordan. An important goal is increased energy efficiency in wastewater treatment plants and therefore lower expenses due to reduced electricity consumption. The chosen way to achieve this goal is through implementation of Technical Sustainable Management adapted to the Jordanian context. Three wastewater treatment plants in Jordan have been chosen as a case study for the investigation. These choices were supported by the fact that the three treatment plants are suitable for average performance and size. Beyond that, an energy assessment has been recently conducted in those facilities.

The project succeeded in proving the following hypothesis:

Energy efficiency in wastewater treatment plants can be improved by implementing principles of Technical Sustainable Management adapted to the Jordanian context.

With this case study a significant increase in energy efficiency can be achieved by optimization of operational performance, identifying and eliminating of shortcomings and appropriate plant management. Implementing Technical Sustainable Management as a low-cost tool with comparable little workload, provides several additional benefits supplementing increased energy efficiency, including compliance with all legal and technical requirements, process optimization, but also increased work safety and convenient working conditions.

The research in the chosen field continues, because there are indications for possible integration of the adapted tool into other regions and sectors. The concept of Technical Sustainable Management adapted to the Jordanian context could be extended to other wastewater treatment plants in all regions of Jordan but also into other sectors including water treatment, water distribution, wastewater network, desalination, or chemical industry.

***Keywords*—**Energy efficiency, quality management system, technical sustainable management, wastewater treatment.

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Techno-Economic Analysis of Offshore Hybrid Energy Systems with Hydrogen Production

Anna Crivellari, Valerio Cozzani

Abstract—Even though most of the electricity produced in the entire world still comes from fossil fuels, new policies are being implemented in order to promote a more sustainable use of energy sources. Offshore renewable resources have become increasingly attractive thanks to the huge entity of power potentially obtained. However, the intermittent nature of renewables often limits the capacity of the systems and creates mismatches between supply and demand. Hydrogen is foreseen to be a promising vector to store and transport large amounts of excess renewable power by using existing oil and gas infrastructure. In this work, an offshore hybrid energy system integrating wind energy conversion with hydrogen production was conceptually defined and applied to offshore gas platforms. A techno-economic analysis was performed by considering two different locations for the installation of the innovative power system, i.e., the North Sea and the Adriatic Sea. The water depth, the distance of the platform from the onshore gas grid, the hydrogen selling price and the green financial incentive were some of the main factors taken into account in the comparison. The results indicated that the use of well-defined indicators allows to capture specifically different cost and revenue features of the analyzed systems, as well as to evaluate their competitiveness in the actual and future energy market.

Keywords—cost analysis, energy efficiency assessment, hydrogen production, offshore wind energy

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The Dangers of Attentional Inertia in the Driving Task

Catherine Thompson, Maryam Jalali, Peter Hills

***Abstract*—**The allocation of visual attention is critical when driving and anything that limits attention will have a detrimental impact on safety. Engaging in a secondary task reduces the amount of attention directed to the road because drivers allocate resources towards this task, leaving fewer resources to process driving-relevant information. Yet the dangers associated with a secondary task do not end when the driver returns their attention to the road. Instead, the attentional settings adopted to complete a secondary task may persist to the road, affecting attention, and therefore affecting driver performance. This "attentional inertia" effect was investigated in the current work. Forty drivers searched for hazards in driving video clips while their eye-movements were recorded. At varying intervals they were instructed to attend to a secondary task displayed on a tablet situated to their left-hand side. The secondary task consisted of three separate computer games that induced horizontal, vertical, and random eye movements. Visual search and hazard detection in the driving clips was compared across the three conditions of the secondary task. Results showed that the layout of information in the secondary task, and therefore the allocation of attention in this task, had an impact on subsequent search in the driving clips. Vertically presented information reduced the wide horizontal spread of search usually associated with accurate driving and had a negative influence on the detection of hazards. The findings show the additional dangers of engaging in a secondary task while driving. The attentional inertia effect has significant implications for semi-autonomous and autonomous vehicles in which drivers have greater opportunity to direct their attention away from the driving task.

***Keywords*—**Attention, eye-movements, hazard perception, visual search.

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The Description of Biker's Perception toward Traffic Violence Behavior in Makassar, Indonesia

Sulasmi Sudirman, Jailani Rumasoreng

***Abstract*—**Motorbike is one of road vehicles in Indonesia. Motorbike is also the most affordable transportation and also less time consume. Motorbike has always been a main cause of road accident and traffic jam. This research aimed to explore how bikers think toward traffic violence behavior in Makassar, Indonesia. The bikers' behavior on the road is a trigger of other road users' anger. They seem to be selfish and uncontrolled on speed. The particular issue here is also the way bikers take over other motorbikes or cars. These lead to accident and conflict among road users. The participants of the research were the bikers. The research used qualitative approach as method. The research showed that lack of knowledge and information on traffic regulation were one of main points of traffic violence behavior. Therefore, being exposed on safety riding knowledge is not significantly contribute safety riding behavior. The respondents stated that they often committed to traffic violence. However, the respondent underlined they have enough information on traffic regulation, even though they pretended that they know nothing about the rules. This indicated that bikers tend to ignore the traffic regulation, although they have sufficient information. It can be concluded that traffic violence can be appear on bikers riding behavior if they have sufficient traffic regulation knowledge.

***Keywords*—**Bikers, behavior, traffic, violence.

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The Development of the Jordan Valley

Ahmad M. Alzouby

Abstract—Purpose of the project: To develop Jordan Valley into a 13th independent administrative governorate. The idea of the project is to merge the three sub-districts (Shunal Shamaliya, Deir Alla, Shunal Janubiya) into a single administrative governorate. The three sub-districts have economic, geographical and demographic similarities, but they are currently divided between three administrative governorates. The number of inhabitants which is divided into three sub-districts prevents them from acquiring an even and sufficient distribution of financial allocations provided by the government. The inhabitants of these sub-districts suffer from negligence regarding the process of development undergoing in Jordan. The idea of the project is to merge the three sub-districts (Shunal Shamaliya, Deir Alla, Shunal Janubiya) into a single administrative governorate. The three sub-districts have economic, geographical and demographic similarities, but they are currently divided between three administrative governorates. The number of inhabitants which is divided into three sub-districts prevents them from acquiring an even and sufficient distribution of financial allocations provided by the government. The inhabitants of these sub-districts suffer from negligence regarding the process of development undergoing in Jordan.

Keywords—administrative governorate, Deir Alla, Jordan Valley, Shuna Janubiya, Shuna Shmaliya

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The Dialectic of Introspection and External Observation: An Autoethnography of Religious Prayer Practices in Israeli Reform Jewish Congregations

Elazar Ben-lulu

***Abstract*—**"I sought to understand why touching the Torah scroll caused me uncomfortable feelings. The moment when I decided not to touch the scroll also had to do with fear of touching the "sacred" in the symbolic sense, of severing the continuity of the Jewish ritual as it had been practiced throughout the ages". This lecture examines how the ethnographer's positionality in the ethnographic observation of religious practices is constructed by the intersection of his religious and researcher identities. By conducting fieldwork research in Israeli Reform Jewish congregations, this presentation show how ethnographic observation is a reflexive performance - which is implemented by participation and avoidance during the religious praxis. It suggests that an autoethnography during fieldwork in religious prayer offers ethnographers an opportunity to analyze constructions of religious identities and practices in the contemporary social research.

Furthermore, this research suggests that reflexivity and autoethnographic writing highlight not only the research's methodological dilemmas, but also expand the theoretical aspect of religious ritual. For instance, some ethnographic findings contributes to the existing scholarship on the New Age perception of the body as a social agent in religious praxis, in this case values of gender equality and individualism.

***Keywords*—**Ethnography, Fieldwork, Reform Judaism, Identity, Autoethnography.

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The Effect of Loud Working Environment on Incidence of Back Pain

Marcel Duh, Jadranka Stricevic, David Halozan, Dusan Celan

Abstract—Back pain is not only the result of structural or biomechanical abnormalities of the spine but is also associated with cognitive and behavioral aspects of pain and thus represents biopsychosocial problem. Stressors are not only interpersonal conflicts, negative life events, and dangerous situations but also noise. Effects of noise on human beings are psychological (excitement, stress), sensory, and physiological. The harmful effects of noise can be seen in the 40-65 dB range and are manifested as fatigue, irritability, poor sleep and psychological discomfort of the worker. Within 65-90 dB range, body metabolism increases, oxygen consumption is higher, tachycardia and hypertension appear, and the tone of skeletal muscles increases. The purpose of the study was to determine whether the stress caused by noise at the work place increases the incidence of back pain. Measurements of noise levels were carried out in three different wards of social care institution. The measurement on each ward was repeated 3 times (total of 9 measurements) for 8 hours during the morning shift. The device was set up in the room where clients spent most of the day. The staff on the ward replied to the questionnaire consisting of closed type questions about basic demographic information and information about back pain. We find that noise levels as measured in our study had no statistically significant effect on the incidence of back pain ($p = 0.90$). We also find that health care workers who perceive their work as stressful, have more back pain than those who perceive their job as unstressful, but correlation is statistically insignificant ($p = 0.682$). With our study, we have proven findings of other authors, that noise level below 65 dB does not have a significant influence on the incidence of back pain.

Keywords—health care workers, musculoskeletal disorder, noise, sick leave

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The Evaluation of a Mobile Proximity Payment Application through Its Legitimacy and Social Acceptability

Intissar Abbes, Yousra Hallem, Jean-michel Sahut

Abstract—The purpose of this research is to explore the legitimacy of a proximity mobile payment (PMP) system by taking into account the social aspects related to its use (social acceptability). We have chosen to focus on the acceptability process of a PMP application ('Flashplay') from the first testing to the adoption in a service context. This PMP solution is a pilot program developed as part of a global strategy of disintermediation in various sectors (retail, catering, and entertainment). This case is particularly interesting for two reasons: the context and environment are suitable to the adoption of innovation in payment like other African countries and the possibility to study different stages of the social acceptability process of that PMP system. The neo-institutional theory is mobilized to identify the three pillars of legitimacy: cognitive, normative and regulatory. A longitudinal qualitative study was conducted with 27 customers using the PMP service. Results highlighted the importance of the consumption system and the service provider as institutions. Recommendations are thus proposed to PMP service providers in order to rethink the design and implementation strategies of their PMP system to ensure their adoption and promote the institutionalization of this type of consumption practice.

Keywords—legitimacy, payment, acceptability, mobility

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The Politics of Disruption: Disrupting Polity to Influence Policy in Nigeria

Okechukwu B. C. Nwankwo

Abstract—The surge of social protests sweeping through the globe is a contemporary phenomenon. Yet the phenomenon in itself is not new. Thus, various scholars have over the years developed conceptual frameworks for evaluating it. Adopting and adapting some of these frameworks this paper begins from a purely theoretical perspective exploring the concept and content of social protest within the specific context of Nigeria. It proceeds to build a typology of the phenomenon in terms of form, actors, origin, character, organisation, goal, dynamics, outcome and a whole lot of other variables that are context relevant for evaluating it in an operationally useful manner. The centrality of the context in which protest evolves is demonstrated. Adopting Easton's systems theory, the paper builds on the assumption that protests emerge whenever and wherever political institutions and structures prove unable or unwilling to transform inputs in form of basic demands into outputs in form of responsive policies. It argues that protests in Nigeria are simply the crystallisation of opposition in the streets. Protests are thus extra-institutional politics. This is usually the case, as elsewhere, where there is no functional institutionalised opposition. Noting that protest, disruptive or otherwise, is an influence strategy, it argues that every single protest is a new opportunity for reform, for reorganisation of state capacities, for modifying rights and obligation of citizens and government to each other. Each reform outcome is, however, only a temporal antecedent. Its extensity gives signal for the next similar protest event. Through providing evidence on how protests in Nigeria create opportunity for reform, for more accountable, more effective governance, the paper shows the positive impact of protests and its importance even in the consolidation effort for the nation's nascent democracy. Data on protest events will be based on media reports, especially print media.

Keywords—democracy, dialectics, social protest, reform

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Theory of Mind in Students Who Study a Second Language Academically Compared to Controls

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***Abstract*—**Introduction: Theory of Mind (TOM) is our ability to predict behaviors of others in terms of their underlying intentions which has been examined using "Reading the Mind in the Eyes" (RME) task. This research examined TOM in students studying a second language academically and students who do not study a second language as a field of study.

Method: In this causal-comparative study using available sampling method, 30 junior graduate students of German language and literature and 30 junior students of social sciences from University of Tehran were selected. Participants were similar in terms of mother tongue and gender. They responded to the computerized version of RME test (adult). Data analysis was performed using independent t-test.

Results: Students who study a second language academically performed significantly better, in their REM, than students who do not study a second language academically. The development of brain processes in the theory of mind—from general to specific regions—may indicate the automatization of this ability in those who are academically learning a second language.

Discussion: Academic learning of a second language can therefore strengthen the pathways and brain regions involved in the theory of the mind of these people. These results also suggest that learning a second language academically uses different sources of brain processing to understand the theory of mind, which differs depending on the language being instructed and this difference is observable when reading the mental state.

***Keywords*—**Acquiring, Reading the Mind in the Eyes, Second Language, Theory of Mind.

I. INTRODUCTION

Theory of mind makes it possible for people to infer different states of mind of both others and self-such as desires beliefs and knowledge [1]. These interpreted mental states are not noticeable so one must develop a theory and predicts the way somebody behaves. that is the reason why ToM is referred to as a theory. others are presumed to have minds analogous to one's own and this presumption relies on the reciprocal social interaction being observed in joint attention, the understanding of others emotions and actions [2], and the functional use of language [3] .

there has been a rapid growth in Research on theory of mind, in humans and animals, adults and children since Premack and Guy Woodruff's paper, "Does the chimpanzee have a theory of mind?".[1] the developing field of social neuroscience has also started to work on this issue by monitoring the brains of humans while they perform tasks that requires an understanding of intention beliefs and other mental states in others.

ToM is considered to be important in important in everyday interactions and relations with other individuals and appears to be a core of social cognition. false belief is a task that is widely used to measure the development of ToM it is found that performance on ToM is linked with higher executive functioning, as well as better language abilities [4].

Furthermore, language has been said to be inseparable from ToM [5]

the ability to read the mind of the individuals, the use of the language and seeing things from someone else's perspective are socio-cognitive abilities that separate humans and chimpanzees from each other. Language is considered to be a contributing factor in many facets of social and emotional development. different methods have been used to examine the relationship between ToM and language. it is found by Jenkins and Astington(1996) that the performance on false belief task is closely connected with the general language ability [6].

learning two languages at the same time during the childhood years has become in the past 2 decades so common and attracted considerable scientific attention attention [7].

For example, findings by Bialystok and Majurnmder(1998) have shown that when comparing bilinguals and monolinguals nonverbal problem-solving ability the first group (bilinguals) outperform the other group in solving a problem that demands a higher level of intentional control [8]. studies concerning the relation between language and ToM [9], [10], [11] development have been carried out to investigate the development of ToM in bilingual children.

for example a study was conducted by Goez(2003) to investigate the relation between ToM and perspective taking between three groups of children Chinese monolingual, English monolingual, and Chinese English bilingual children [12]. The findings revealed that bilinguals outperformed by both monolingual groups at the first time but not at the second time

In brief, according to evidences, both theory of mind and language development in humans are strongly related. Based on a meta-analysis, there appears to be a moderate to strong correlation (r=0.43) between performance on theory of mind and language tasks. [5]

This relationship is said to be because of the fact that both language and theory of mind begin to develop around the same period in children (between ages 2–5).

there are other abilities, however, that seem to develop during this period of time but with no relation with one another and nor with theory of mind.

there must be some other reasons to explain this correlation between language and theory of mind.

in addition to the hypothesis in question ,there are evidences to show that there is a close connection between the areas of the brain responsible for the language and theory of mind .

The ability of learning new vocabulary, as well as perceiving and reproducing words has been shown to

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Therapeutic Challenges in Treatment of Adults Bacterial Meningitis Cases

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***Abstract*—Background:** The outcome of bacterial meningitis is strongly related to the the resistance of bacterial pathogens to the initial antimicrobial therapy. The objective of the study was to analyze the initial antimicrobial therapy, the resistance of meningeal pathogens and the outcome of adults bacterial meningitis cases.

Materials/methods: This prospective study enrolled 46 adults older than 16 years of age, treated for bacterial meningitis during years 2009 and 2010 at the Infectious diseases clinic in Prishtinë. Patients are categorized into specific age groups: >16-26 years of age (10 patients), >26-60 years of age (25 patients) and >60 years of age (11 patients). All p-values <0.05 were considered statistically significant. Data were analyzed using Stata 7.1 and the SPSS 13.

Results: During the two year study period 46 patients (28 males) were treated for bacterial meningitis. 33 patients (72%) had a confirmed bacterial etiology; 13 *meningococci*, 11 *pneumococci*, 7 *gram - negative bacilli* (Ps. aeruginosa 2, *Proteus sp. 2*, *Acinetobacter sp.* 2 and *Klebsiella sp.* 1 case) and 2 *staphylococci* isolates were found. Neurological complications developed in 17 patients (37%) and the overall mortality rate was 13% (6 deaths). Neurological complications observed were: cerebral abscess (7/46; 15.2%), cerebral edema (4/46; 8.7%); haemiparesis (3/46; 6.5%); recurrent seizures (2/46; 4.3%), and single cases of thrombosis sinus cavernosus, facial nerve palsy and decerebration (1/46; 2.1%). The most common meningeal pathogens were meningococcus in youngest age group, gram negative-bacilli in second age group and pneumococcus in eldery age group. Initial single-agent antibiotic therapy (ceftriaxone) was used in 17 patients (37%): in 60% of patients in youngest age group and in 44% of cases in second age group. 29 patients (63%) were treated with initial dual-agent antibiotic therapy; ceftriaxone in combination with vancomycin or ampicillin. Ceftriaxone and ampicillin were the most commonly used antibiotics for the initial empirical therapy in adults >50 years of age. All adults >60 years of age were treated with the initial dual-agent antibiotic therapy as in this age group was recorded the highest mortality rate (M=27%) and adverse outcome (64%). Resistance of pathogens to antimicrobics was recorded in cases caused by gram negative bacilli and was associated with greater risk for developing neurological complications (p=0.09). None of the *gram-negative bacilli* were resistant to carbapenems, all were resistant to ampicillin while 5/7 isolates were resistant to cefalosporins. Resistance of meningococci and pneumococci to betalactams was not recorded. There were no statistical differences in the occurrence of neurological complications (p>0.05), resistance of meningeal pathogens to antimicrobics (p>0.05) and the inital antimicrobial therapy (one vs. two antibiotics) concerning group-ages in adults.

Conclusions: The initial antibiotic therapy with ceftriaxone alone or in combination with vancomycin or ampicillin did not cover cases caused by gram-negative bacilli.

***Keywords*—Adults, bacterial meningitis, outcomes, therapy.**

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Thermal Performance of Plate-Fin Heat Sink with Lateral Perforation

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***Abstract*—**Over the past several decades, the development of electronic devices has led to higher performance. Therefore, an electronic cooling system is important for the electronic device. A heat sink which is a part of the electronic cooling system is continuously studied in the research field to enhance the heat transfer. To author's best knowledge, there have been only a few articles which reported the thermal performance of plate-fin heat sink with perforation. This research aims to study on the flow and heat transfer characteristics of solid-fin heat sink (SFHS) and laterally perforated plate-fin heat sink (LAP-PFHS). The SFHS and LAP-PFHSs are investigated on the same fin dimensions. The LAP-PFHSs are performed with a 27 perforation number and two different diameters of circular perforation (3 mm and 5 mm). The experimental study is conducted under various Reynolds numbers from 900 to 2,000 and the heat input of 50W. The experimental results show that the LAP-PFHS with perforation diameter of 5 mm gives the minimum thermal resistance about 25% lower than SFHS. The thermal performance factor which takes into account the ratio of the Nusselt number and ratio of friction factor is used to find the suitable design parameters. The experimental results show that the LAP-PFHS with the perforation diameter of 3 mm provides the thermal performance of 15% greater than SFHS. In addition, the simulation study is presented to investigate the effect of the air flow behavior inside the perforation on the thermal performance of LAP-PFHS.

***Keywords*—**Heat sink, Parallel flow, Circular perforation, Non-bypass flow.

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Treatment of Cyanide Effluents with Platinum Impregned on Mg-Al Layered Hydroxides

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Abstract—Cyanide leeching is the most used technology for gold mining industry, which produces large amounts of effluents requiring treatment. In Ecuador the development of gold mining industry has increased, causing significant environmental impacts due to the highly use of cyanide, it is estimated that 10 gr of extracted gold generates 7000 liters of water contaminated with 300mg/L of free cyanide. The most common methods used nowadays are the treatment with peroxodisulfuric acid, ozonation, H_2O_2 and other reactants which are expensive and present disadvantages. Several methods have been developed to treat this contaminant such as heterogeneous catalysts. Layered double hydroxides (LDHs) have received much attention due to their wide applications like a catalysis support. Therefore, in this study, Mg-Al/ LDH was synthetized by coprecipitation method and then platinum was impregned on it, in order to enhance its catalytic activity. Two methods of impregnation were used, the first one, called incipient wet impregnation and the second one was developed by continuous agitation of LDH in contact with chloroplatinic acid solution for 24 h. The support impregnated was analyzed by X-ray diffraction, FTIR and SEM. Finally, the oxidation of cyanide ion was performed by preparing synthetic solutions of sodium cyanide (NaCN) with an initial concentration of 500 mg/L at pH 10,5 and air flow of 180 NL/h. After 8 hours of treatment, an 80% of oxidation of ion cyanide was achieved.

Keywords—catalysis, cyanide, LDHs, mining

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Understanding Gender-Specific Attack Rates in Zika Epidemics

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Abstract—In 2015-16 South America went through the largest Zika epidemic in recorded history. One important aspect of this epidemic was the impact on newborns due to the effect of Zika on development of the central nervous system leading to severe malformations. It also became evident from data the importance of sexual transmission, leading to increased risk for women. We propose a mathematical model for the transmission of the Zika virus including sexual transmission via all forms of sexual contact, as well as vector transmission, assuming a constant availability of mosquitoes. From this model, we derive an expression for R0 which is used to study and analyze the relative contributions of male to female sexual transmission route vis-a-vis vectorial transmission. We also fit the model to data from the 2016 Zika epidemic in Rio de Janeiro, to estimate the values of key parameters of the model.

Keywords—attack rate, epidemiology, sexual transmission, Zika

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Underwater Vehicles Dynamics Modeling upon the Surrogates Models

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Abstract—The project aims to develop a general framework for modeling of underwater vehicles for monitoring missions in sea water environments. The research problems formulated in the project work program concentrate in two basic research domains – modern mechanics methods, specifically analytical mechanics of complex mechanical systems and computational fluid dynamics (CFD). The starting point and inspiration to the project research are, from one hand, intensive research that goes on in the area of dynamics modeling of underwater vehicles, their maneuverability and performance, driven by their increasing applications in oceanography, military, natural environment safety, and, from the other hand, basic research aimed to generate adequate dynamic models of underwater vehicles. The project formulates two direct research objectives. The first research objective is to develop a general dynamics model of an underwater vehicle for variable mass systems and latest methods of the CFD for accurate assessment of dynamic effects between the vehicle and the external sea water environment. Development, adaptation and implementation of modeling methods of hydrodynamic effect determination for such systems interacting with an external sea water environment based upon the latest idea in the computational fluid dynamics, i.e. upon surrogate models. Accordingly, the project sets a new approach to modeling underwater vehicles. Kriging process of surrogate are taken into consideration. The surrogates will be "trained" on appropriately selected reference cases – the "samples" of motions. Steady flows around the moving vehicle will be determined by the finite-volume-based Ansys Fluent solver working on sliding meshes, and the hydrodynamic forces and moments will be thus determined.

Keywords—AUV, computational fluid dynamics, drag, glider, underwater glider

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Wood Decay Fungal Strains Useful for Bio-Composite Material Production

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***Abstract*—**Interest on wood decay fungi (WDF) has been increasing in the last years thanks to the potentiality of this kind of fungi; research on new WDF strains has increased as well thus pointing out the key role of the culture collections. One of the most recent biotechnological application of WDF is the development of novel materials from natural or recycled resources. Based on different combinations of fungal species, substrate and processing treatment involved (e.g. heat pressing), it is possible to achieve a wide variety of materials with different features useful for many industrial applications: from packaging to thermal and acoustic insulation. In comparison with the conventional ones, these materials represent a 100% natural and compostable alternative involving low amounts of energy in the production process. The purpose of the present work was to isolate and select WDF strains able to colonize and degrade different plant wastes thus producing a fungal biomass shapeable to achieve bio-composite materials. Strains were selected within the mycological culture collection of Pavia University (MicUNIPV, over 300 strains of WDF). The selected strains have been investigated with regards their ability to colonize and degrade plant residues from the local major cultivations (e.g. poplar, alfalfa, maize, rice and wheat) and produce the fungal biomass. The degradation of the substrate was assessed by Thermogravimetric analysis (TGA) and Fourier Transform Infrared Spectroscopy (FTIR). Chemical characterization confirmed that TGA and FTIR are complementary techniques able to provide quali-quantitative information on compositional and structural variation that occurs during the transformation from substrate to bio-composite material. This pilot study provides a fundamental step to tune further applications in fungus-residues composite biomaterials.

***Keywords*—**Bio-composite material, lignocellulosic residues, sustainable materials, wood decay fungi.

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