出國報告（出國類別：開會）

參加 2013 年國際自動控制及機電工程研討會

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摘要

2013 年第 2 屆國際自動控制暨機電工程研討會 (2013 The 2nd International Conference on Automatic Control and Mechatronic Engineering , ICACME 2013)，為年度性之國際學術會議，本次會議由 BOSI Education & Consultancy Co., Ltd 主辦，IEEE (Institute of Electrical and Electronics Engineers)及 TTP(Trans Technical Publishers inc.)協辦, 於 6 月 21~22 日在泰國曼谷的 Pullman Bangkok King Power 飯店舉行，進行一系列學術研究成果發表及新知討論。

本次研討會會共有來自五大洲等數十個國家及地區之多位學者專家及研究人員參與，發表之論文包括航太、機械、機電、控制等領域之相關文獻，均深獲與會學者之興趣及討論。此外，藉由參與大會各國專家學者之交換研究心得及吸取他人寶貴之研究經驗，將可做為個人日後教學及研究之參考。

筆者此次獲國科會出國經費補助，其發表論文題目為"具尾翼彈體的氣動力特性與飛行軌跡研究 The Aerodynamic Attributes and Flight Trajectories of a Tail Fin-Stabilized Projectile"， 於會場進行 15 分鐘的口頭報告，並與在場學者交換研究心得，達到世界各國學者交流的目的，獲益良多。

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壹、 會議目的

2013 年第 2 屆國際自動控制暨機電工程研討會 (2013 The 2nd International Conference on Automatic Control and Mechatronic Engineering , ICACME 2013)，其會議宗旨在於結合世界各國包括自動控制技術、自動控制理論及應用、機械設計、機電工程、機械製造技術、電子學和自動化等。機械、機電、航空、控制等研究領域之學者專家，進行一系列學術研究成果發表及新知討論，本次會議由 BOSI Education & Consultancy Co., Ltd 主辦，IEEE (Institute of Electrical and Electronics Engineers)及 TTP(Trans Technical Publishers inc.)協辦，於 6 月 21~22 日於在泰國曼谷的 Pullman Bangkok King Power 飯店舉行有許多不同國家和地區的投稿。作為 TTP 官方列表的正式會議，ICACME 經同行專家評審錄用的論文將全部出版在《Applied Mechanics and Materials》[ISSN:1660-9336, Trans Tech Publications]上。目前，該刊物上發表的論文全部被 EI Compendex 和 ISTP 收錄。會議論文由 TTP 公開出版發行，包括 Indexed by Elsevier: SCOPUS www.scopus.com and Ei Compendex (CPX) www.ei.org/. Cambridge Scientific Abstracts (CSA) www.csa.com, Chemical Abstracts (CA) www.cas.org, Google and Google Scholar google.com, ISI (ISTP) www.isinet.com, Institution of Electrical Engineers (IEE) www.iee.org,均列入索引，筆者所投稿的文章有幸能獲接受，並在 132 篇論文獲邀為 24 篇口頭報告。ICACME 所主辦之學術研究年會、研討會及專題討論會，皆對該學術領域有深遠的影響及貢獻。因此，我們除了有機會參與大會之學術研討及發表研究論文外，更可藉由參與大會而與來自世界各地之專家學者交換研究心得及吸取他人寶貴之研究經驗，以做為個人日後教學及研究之參考。

貳、 會議過程

(一)本屆會議共有來自歐洲、美洲、澳洲及亞洲等數十個國家及地區之多位學者專家及研究人員參與為期兩天之學術論文發表及討論會。會議地點在大都會泰國首都曼谷舉行。共計132篇論文發表，其中口頭報告僅24篇 。

(二)筆者此次發表的論文，題目為"具尾翼彈體的氣動力特性與飛行軌跡研究 The Aerodynamic Attributes and Flight Trajectories of a Tail Fin-Stabilized Projectile"，為執行年度國科會計畫「三維反坦克飛彈之計算模擬與六自由度軌跡分析之研究」的成果發表，其內容主要說明，本文結合低速風洞實驗，計算流體力學與 Matlab/Simulink 控制軟體，對一具尾翼穩定的投射彈體進行氣動力分析與四自由度軌跡模擬，飛行條件 M=0.6、攻角α=-60°~60°。以 Karman-Tsien rule 的修正的實驗數據與 CFD 計算結果比較，+/-攻角 30 度以內，C_d , C_l與 C_m均相近。+/-攻角 60 度以內，彈體具良好的氣動力特性可保持飛行穩定。模擬彈體的四自由度軌跡與射表資料相比對，不同米位(仰角)的彈道最大高度相差 3.07%~4.68%、射程距離相差 0.15%~5.72%。本研究可建立一套氣動力設計、流場分析比對與飛行軌跡模擬的方法減少實測的花費。全文詳如附件。

(三)依會議期程，第一天為報到，詳如附會議期程表。第二天為會議重點，第一場邀請的 Keynote Speaker 為馬來西亞 University Sains Malaysia 的 Prof. Mohd Zulkifly Abdullah 演講的主題是計算流體工程在微電子工業的應用於挑戰 Computational Fluid Engineering: Applications and Challenges in Microelectronic Industries，演講重點在說明，小型化和多樣化的積體電路（IC）封裝已成為微電子工業是一個挑戰。 原 IC 封裝用傳統的試驗和錯誤方法的既費時又花錢，這些困難成為研究的瓶頸。計算流體動力學（CFD）和計算固體力學（CSM），在電子封裝的應用程序的幫助可提高 IC 封裝，並已提供的物理化學方面的過程中的更好的理解。此外，流體流動的行為，如在 IC 封裝和回流焊接加熱成型化合物可以通過 CFD/CSM 模擬的預測。預測給出一個清晰的可視化 CFD/CSM 後處理過程中的流體流動現象。 CFD/CSM 可以用在許多不同的應用。本文提供的訊息可以 CFD/CSM 的應用挑戰在 IC 封裝和流焊工藝所做的大量工作。第二場為邀請的 Keynote Speaker 為印度 Shri Ramdeobaba College of Engineering and Management 的 Prof. Vinay Barhate，演講的主題是 使用數值繼電器在整體的電力系統防護 Overall Scenario of Power System Protection using Numerical Relays ，演講重點在說明電力系

統保護的最新狀態。在 100 多年的歷史，保護繼電器電源系統工程師已經看到了許多新的發展。例如在瑞典的 ABB 繼電器歷史，第一種保護繼電器類型是在早年 1900 年開發的，應用於世界各地數以百萬計的保護和控制設備。第二種是靜態或電子繼電器，在 20 世紀 60 年代被引入。基於微處理器的繼電器在 80 年代初開始，以微處理器執行的邏輯來過濾模擬。第一個全數字繼電器是在 1986 年推出，並自那時以來，數值繼電器已經開始逐步淘汰傳統的繼電器由於其靈活性，小尺寸，可靠性，數字通信和多功能能力。然而更高的精度未必轉化為更好的保護，暴露於外部的瞬態干擾，更快的決策本身並無價值，有時斷路器仍需要中斷方向的防護和中斷更快的能力，克服這種局限性使保護系統更加強大和可靠是一種個挑戰。

筆者口頭報告場次為6月22日第二場次，場次主持人為國內成功大學機械系特聘教授施明璋教授，他鄉遇故知，倍覺親切，報告投影片詳如附件二。報告結束，主持人及與會學者對我們所提出的問題是，(1)為何使用的是低速風洞，而不是次音速風洞?(2)本研究方法的臨界馬赫數的極限為何?，我的解釋是本研究所用的低速風洞，其流速範在20公尺/秒以下為一典型的不可壓縮流場，而所模擬的彈體其流速範圍約在0.6~0.8馬赫左右為一次音速流場，當流速大於0.3馬赫，流體即具有可壓縮性，以次音速風動洞來進行試驗當然最好，但一具次音速風洞造價約300萬美金，其相關吹試及維持費用亦相當驚人，而本文所用的低速風洞僅約5萬美金左右，僅為其1/60的價格，考量流體的壓縮性將實驗數據經由Karman-Tsien 的校正公式修正流體的可壓縮性，其誤差在可接受的範圍內，但做為學術性的研究仍有相當的價值。第2個問題，本研究的臨界馬赫數，約在0.9馬赫，但彈體有震波產生，為一物理特性的不連續，此時將無法以低速風洞進行實驗，僅能以計算流體力學的方法而進行模擬，無法有實驗資料相互比對。

(四)會議相關的議程、其餘的口頭報告摘要重點、交流與互動照片，均詳如附件。值得一提的是筆者本次會議發表的論文，已獲經本次會議轉投於 Applied Mechanics and Materials 期刊第 415 期的期刊論文，學術表現獲得舉辦單位的肯定。

參、 會議心得

本次研討會在泰國首都曼谷舉行，為一國際性大都會。曼谷機場規模遠大於桃園機場，並已有機場捷運通至市區相當方便。曼谷市區高樓櫛比鱗次，乍見恐認為其超越台北，然至市區步行，其街道平整性則不若我國，適逢下雨則排水系統幾乎無法發揮作用。街道旁攤商林立有雜亂感，公共工程建設遠不如我國紮實。各色人等往來其間顯示其為觀光之都，一般司機均能與其英文溝通。我國要注意東南亞各國在後急起直追，就觀光的無煙囪產業我們還落後於泰國。

研討會中，透過與各國學者不同領域的思考模式，於問答之間各取所需，達到智識精進功效，印度學者很熱情的與我們交流及交談，惟印度英文口音太重聽起來非常吃力。交流互動最多的還是同為來至台灣的學者，成大施教授與我們有較多時間的交談。成大機械系的教師、學生與研究生人數、設備與相關研究經費均數倍或十倍於筆者所任教之科系。而本院的教師與研究生們仍能戰戰兢兢，在國防教育經費日趨降低的氛圍中仍能慘淡經營，全體師生努力於國防科技的研究，研究成果仍能讓民間大學所肯定的、院部各級長官持續推動整合老師們的研究能量，團隊合作的力量要遠勝於個人，雖然過程並不容易，但要不計較個人得失、毀譽，此點我頗有所感。本院的學生、教師人數與研究經費爭取，均不能與教育部所轄大學相比，惟有整合有限資源互相合作方可有所成。

經過此次研討會歷練，使本人對未來之研究更具信心，將持續於此領域探討研析，並且對於後續之研究將會秉持精益求精的精神戮力完成，並盡已所能將學術研究之成果呈現於各大期刊。亞洲其它國家，如日、韓國、新加坡乃至對岸對於舉辦或參與此類之學術活動均相當熱烈，相信這些國家之科技發展進步神速，成就並非憑空而得，除該國學者藉由不斷參與國際研討會與它國學者學術交流外，更有系統規劃出國留學、短期進修等措施來補強提昇各項研究新知。筆者參與此次會議後，除檢討自己研究上之短處，並吸取別人的長處，加強縝密思考力，提升學術創造力。綜觀本校在研究獎勵教師、研究生出國參加研討會的措施尚有增進之處，應先迎頭趕上與國內一流院校相同，再放眼與國際一流學府相提並論，方有助於建構哲學、

科學、兵學一體教育環境，並與國際接軌的一流軍事學府。

肆、 建議事項

此次出國參加學術研討會為筆者第5次由國科會補助出國參加學術會議，報告原建議三點事項經業管單位初審，雖對本校有正面且具體之建議，但認與研討會內容與主旨無關，所提建議已另由業管權責單位收辦並循程序向上建議。

The Aerodynamic Attributes and Flight Trajectories of a Tail Fin-Stabilized Projectile

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Abstract. Combined with low-speed wind tunnel experiments, this study adopted computational fluid dynamics (CFD) and the MATLAB/Simulink control software to analyze the aerodynamic attributes of a tail fin-stabilized projectile and subsequently simulate its flight trajectory with four degrees of freedom under a flight condition (M) of 0.6 and an angle of attack (α) between -60° and 60°. Comparing the CFD calculation results with the revised experiment data using the Karman-Tsien Rule showed that the aerodynamic coefficients C_D, C_L, and C_M were similar within an angle of attack between -30° and 30°. The projectile further demonstrated excellent aerodynamic attributes within an angle of attack between -60° and 60°, maintaining stable flight. Furthermore, comparing the four-degrees-of-freedom simulation results with data from the firing table showed that the maximum height difference of trajectories at varying angles of elevation (mil) ranged from 3.07% to 4.68%, and the difference in the firing range distance ranged from 0.15% to 5.72%. To reduce the costs of field testing, this study establishes a method to design aerodynamic systems, analyze and compare flow fields, and simulate flight trajectories.

Introduction

In flight, airflow streams over the surface of a projectile, producing multi-directional aerodynamic forces such as lift and drag. These forces influence the flight distance of the projectile. A variation in the angle of attack causes the location of the aerodynamic center to change. This change further generates aerodynamic moment with the centroid of the projectile, which alters the flight attitudes of the projectile. Excessive changes in flight attitude may cause instability and reduce velocity and firing range. When variations exceed the critical angle of attack, the projectile may stall and lose altitude. Thus, aerodynamic attributes are key factors concerning projectile flight, and proficient control over aerodynamic forces and moments evidently becomes an effective method for controlling projectile flight distance and stability. In this context, the aerodynamic coefficients of drag, lift, and pitching moment (i.e., C_D, C_L, and C_M) are critical indicators in the research of projectile flight.

Typically, wind tunnel experiments can be used to measure various projectile-related aerodynamic parameters. Although test equipment and trial testing is extremely costly and time consuming, this experiment method remains irreplaceable. Following the rapid development of CFD in recent years, this method has gradually become the primary tool for aerodynamic analysis. The convenience of CFD calculation results and its flow visualization can be used to compare the results obtained from the wind tunnel experiments [1-2], reducing the costs and number of trial tests. In addition, few general universities accommodate subsonic equipment, and those that offer this type of equipment are responsible for excessive maintenance costs. An ideal and acceptable method to mitigate subsonic wind tunnel experiment (i.e., 0.3-0.8 Mach) costs is alternatively the less expensive low-speed wind

tunnel (i.e., the incompressible flow) combined with the Karman-Tsien rule [3], as shown in Eq. (2), which corrects the compressibility of the air velocity exceeding 0.3 Mach. The corrected aerodynamic parameters can then be compared to the CFD results. Another issue is the significant difficulty to accurately forecast the flight trajectory of projectiles. This issue can be resolved using the widely adopted MATLAB/Simulink [4-5] flight control software, which simplifies trajectory forecasting and control from three to six degrees of freedom. However, this software requires the input of accurate aerodynamic coefficients and related parameters to obtain optimal results.

This study endeavored to investigate the flight aerodynamics, flight stability, and trajectory control of a tail fin-stabilized subsonic projectile. First, a typical low-speed wind tunnel was used to measure the C_D, C_L, and C_M coefficients of a sampled projectile. Then, these coefficients were modified using the Karman-Tsien rule to convert the data to correspond to 0.6 Mach conditions. The revised aerodynamic coefficients were subsequently compared with the CFD simulation results. Finally, the aerodynamic parameters of the projectile were incorporated into the MATLAB/Simulink software, where the four-degrees-of-freedom mode was selected to calculate the flight trajectories. These trajectory results were compared to data from the firing table.

Problems and Methods

Model and Flight Condition. The projectile model used in this study possessed six fins for maintaining stability during flight. The initial flight velocity was approximately 0.6 Mach, as shown in Fig. 1. The conditions for the slow-speed wind tunnel trail test were as follows: Velocity = 10.7 m/s, α = -60° ~ 60°, ambient temperature = 293 K, and ambient pressure = 1atm. A structural grid was adopted as the overall computational grid. The warhead, fins, and gradient variation of the projectile were processed using grid encryption. The overall number of grids was approximately 2.5 million. Fig. 2 illustrates the computational domain. The residual convergence values were all below 10^{-4}.

Governing Equation and Solvers. The governing equations are the Reynolds averaged Navier-Stokes equations, the conservation can be expressed as follows:

$$\frac{\partial U}{\partial t}+\frac{\partial F}{\partial x}+\frac{\partial G}{\partial y}+\frac{\partial H}{\partial z}=\frac{\partial F_v}{\partial x}+\frac{\partial G_v}{\partial y}+\frac{\partial H_v}{\partial z} \quad (1)$$

In solving equation (1), convection terms are calculated by Roe's Scheme, while viscosity and diffusion flux terms are calculated using the central difference method. Discrete space terms are to form a group of ordinary differential equations followed by time integration to obtain the numerical solution. Turbulence model adopted the Spalart-Allmars equation. The condition of inlet boundary and outlet boundary should be set at pressure-far-field condition and pressure-outlet condition, respectively.

Results and Discussion

Wind Tunnel Experiment. The converted experiment data showed that the lift coefficient increased to near-linearity following an increase in the angle of attack, which also simultaneously decreased the negative angle of attack. Stall conditions not were observed when the angle of attack was -60° and 60°, as shown in Fig. 3. Subsequently, the drag coefficient progressively increased following the increase in the absolute value of the angle of attack. When the absolute value of the angle of attack reached 60°, the maximum drag achieved approximately 0.6, as shown in Fig. 4. The pitching moment coefficient demonstrated a value within -0.05 at an angle of attack at -40° and 40°, and within approximately -0.15 at an angle of attack at -60° and 60°, as shown in Fig. 5. These results imply that the aerodynamic design for the projectiles appearance was able to retain flight stability at an angle of attack at -60° and 60°.

$$C = \frac{C_0}{\sqrt{1-M_\infty^2} + \left(\frac{M_\infty^2}{1+\sqrt{1-M_\infty^2}}\right)\frac{C_0}{2}} \quad (2)$$

CFD Simulation. The computational results indicated that the lift coefficient was similar to that in the converted experiment results within an angle of attack at -30° and 30°, and that it exhibited significant differences when the absolute value of the angle of attack was between 40° to 60°, as shown in Fig. 3. The drag coefficients in the computational results were similar to the converted experiment results when the negative angle of attack reached -60° and the positive angle of attack reached 30°. However, the converted experiment results were lower than the computational results when the angle of attack was between 40° and 50°. Theoretically, similar positive and negative angle of attacks should present similar drag coefficients; thus, this study inferred that the gap in the high-angle of attack experiment of the two results was caused by testing table vibrations, as shown in Fig. 4. Based on α = -60° and 60°, the pitching moment coefficient was within -0.05 in the computational results and within -0.15 in the converted experimental results. In the high-angle of attack experiment, the difference between the two results was more evident, which was also inferred to be caused by the vibrations of the trail test. These results indicate that the CFD results maintain greater consistency and avoid biases caused by human error or test equipment vibrations. Results for both trial experiments and CFD show that the aerodynamic attributes of the appearance of a projectile facilitates in maintaining flight stability. A further advantage of CFD is the convenience of flow visualization. Fig. 6 shows that at an angle of attack of 60°, the leeward side of the projectile formed a high-speed, low-pressure area, producing greater lift, whereas the windward side exhibited greater pressure. The location of the stagnation points could also be observed using Fig. 6. Furthermore, Fig. 7 shows that at an angle of attack of 0°, the rear of the projectile formed a low-speed wake flow area.

Flight Trajectory Simulations and Comparison. This study used the MATLAB/Simulink Aerodynamic control module toolkit, and incorporated the various aerodynamic coefficients obtained through CFD into the four-degrees-of-freedom control module, as shown in Fig. 8. Comparing the obtained trajectory simulation results with data from the firing table showed that the maximum height difference of trajectories at varying angles of elevation (mil) ranged from 3.07% to 4.68%, and the difference in firing distance ranged from 0.15% to 5.72%, as shown in Fig. 9. To reduce the costs of field testing, this study integrated wind tunnel experiments, CFD, and MATLAB/Simulink to establish a method to design aerodynamic systems, analyze and compare flow fields, and simulate flight trajectories.

Summary

This study integrated a low-speed wind tunnel experiment, CFD, and MATLAB/Simulink to analyze the aerodynamic attributes and simulate flight trajectories of a tail fin-stabilized projectile. The Karman-Tsien rule was used to revise and convert the air compressibility of the low-speed wind tunnel trial data into subsonic wind tunnel 0.6 Mach data, which could subsequently reduce costs. The results showed that the aerodynamic coefficients C_D, C_L, and C_M of the converted experiment data were similar to the computational data within an angle of attack absolute value within 30°. However, differences at high-angle of attacks were more evident, which were inferred to be caused by testing table vibrations of the trail test. Results for both the trail experiments and CFD showed that the projectile possessed excellent aerodynamic attributes and maintained flight stability within an angle of attack of -60° and 60°. Furthermore, comparing the four-degrees-of-freedom simulation results with data from the firing table showed that the maximum height difference of trajectories at varying angles of elevation (mil) only ranged from 3.07% to 4.68%, and that the difference in the firing range ranged only from 0.15% to 5.72%. This indicates that by integrating wind tunnel experiments, CFD,

and MATLAB/Simulink, an economic method to design aerodynamic systems, analyze and compare flow fields, and simulate flight trajectories for field testes can be established.

Acknowledgment

The author would like to thank the National Science Council of the Republic of China for financially supporting this research under Contract No. NSC 101-2221-E-606-004.

References

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[2] A. Akgül, H.Y. Akargün, B. Atak, A.E. Çetiner, and O. Göker: Scientific Technical Review Vol.62, No.1(2012), p.3-9

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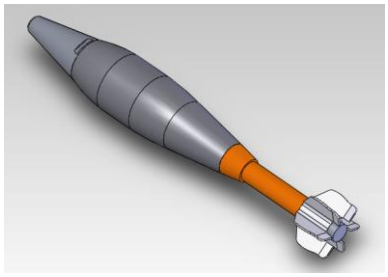


Fig.1 Projectile solid model

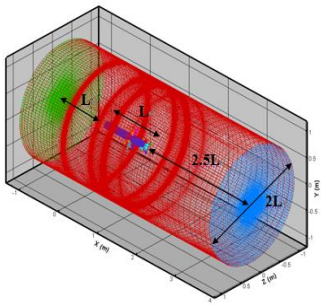


Fig.2 Computational domain

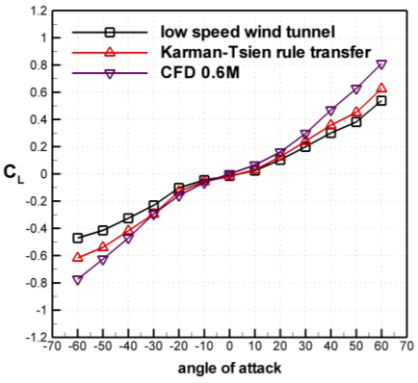


Fig.3 Projectile lift coefficient

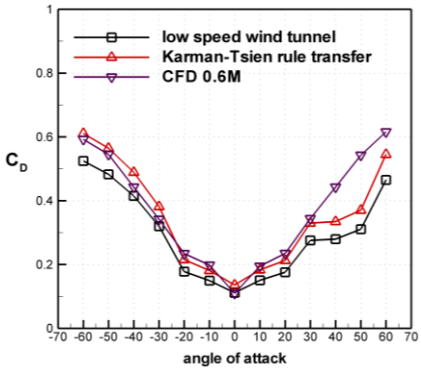


Fig.4 Projectile drag coefficient

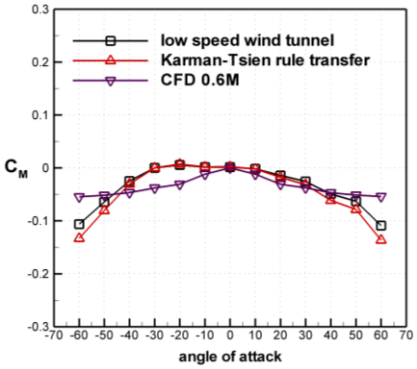


Fig.5 Pitch moment coefficient

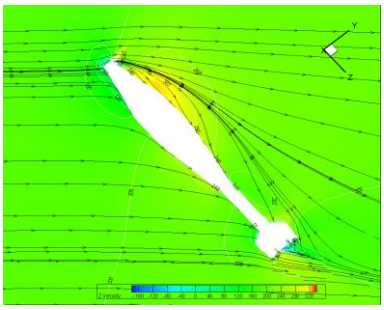


Fig.6 Velocity contour in α =60°

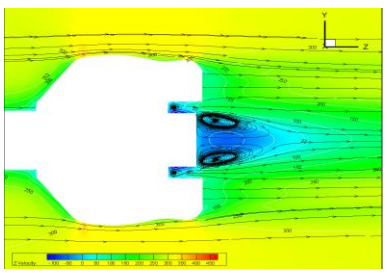


Fig.7 Velocity contour at tail part

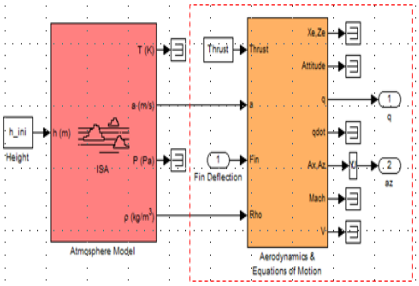


Fig.8 Simulink control module

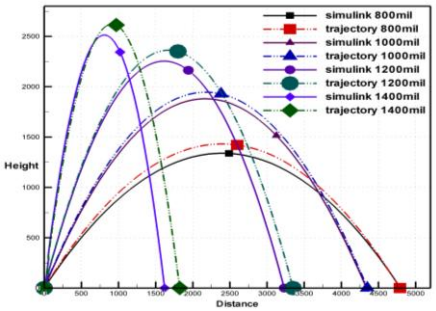


Fig.9 Trajectory comparion

2013 the 2nd International Conference on Automatic Control and Mechatronic Engineering

Study of Aerodynamic Characteristics of a Tail Fin-Stablized Projectile

Author :Ph.D. Chun-Chi Li, Ph.D. Chang-Sheng Tai, Ph.D. Cheng-Chyuan Lai, Shang-Min Fu and Yen-Chun Tsai

Department of Mechatronic, Energy and Aerospace Engineering, Chung Cheng Institute of Technology, National Defense University, Taiwan, R.O.C

Outline

Introduction

low-speed wind tunnel experiments computational fluid dynamics (CFD) MATLAB/Simulink control software **analyze** 1.aerodynamic attributes 2. simulate its flight trajectory with four degrees of freedom

low-speed wind tunnel aerodynamic coefficients **transfor** Karman-Tsien rule **compare** CFD calculation results aerodynamic coefficients

the maximum height difference at varying angles of elevation (mil) ranged from 3.07% to 4.69%

the difference in the firing range distance ranged from 0.15% to 5.72%.

Introduction

Reduce the costs

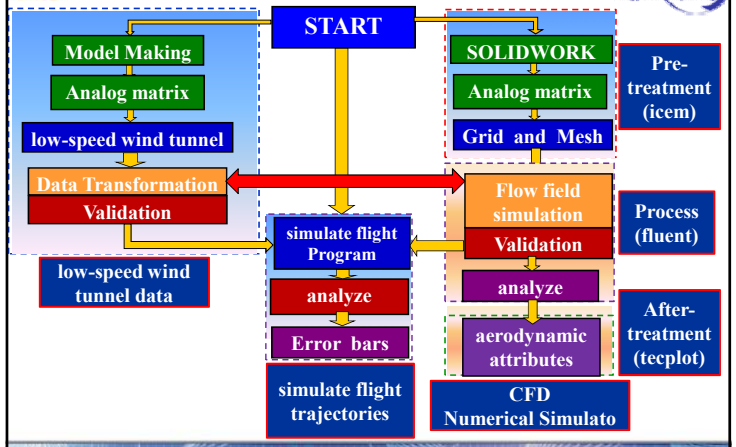
Method | Database

establish

Wind Tunnel | Numerical Simulation | Simulink

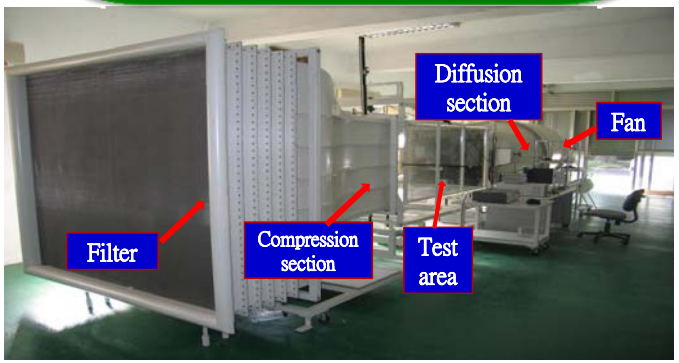
aerodynamic coefficient

Experimental apparatus & method



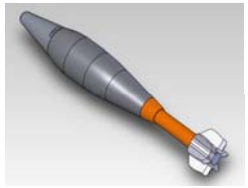
Experimental apparatus & method

low-speed wind tunnel experiments apparatus

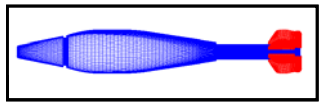


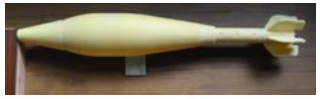
Test area : Lenght200cm、Width100cm 、 Hight100cm

Experimental apparatus & method



Maximum Diameter (mm)	Lenght (mm)	Center of gravity position (mm)
80.57	526.46	206.89



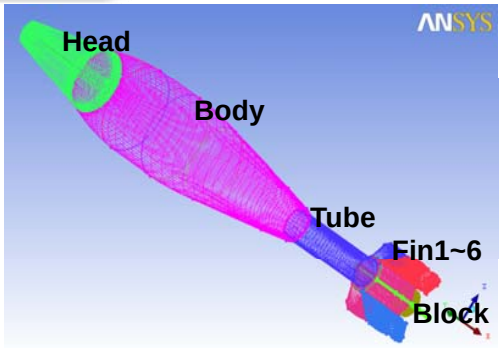


Numerical Simulation → aerodynamic attributes

Wind tunnel experiments → simulate flight trajectories

Experimental apparatus & method

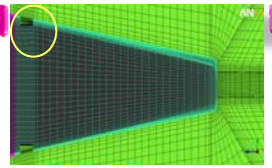
Grid and Mesh



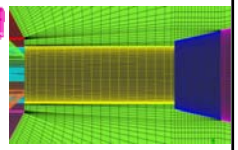
Experimental apparatus & method

Grid and Mesh

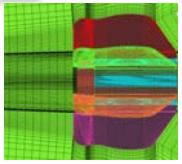
Head

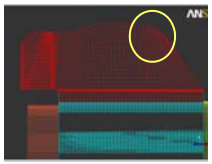


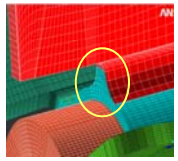
Tube



Fin







Experimental apparatus & method

Wind tunnel experiments

low-speed Imcompressible → Transfor → subsonic compressible

$$C = \frac{C_0}{\sqrt{1-M_\infty^2} + \left(\frac{M_\infty^2}{1+\sqrt{1-M_\infty^2}}\right)\frac{C_0}{2}}$$

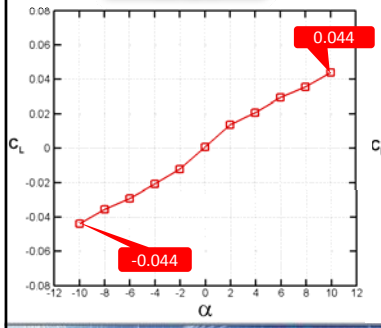
Karman-Tsien Rule

From John D.Anderson,Jr, '' MODERN COMPRESSIBLE FLOW", McGraw-Hill, New York, pp. 333-334, 2004.

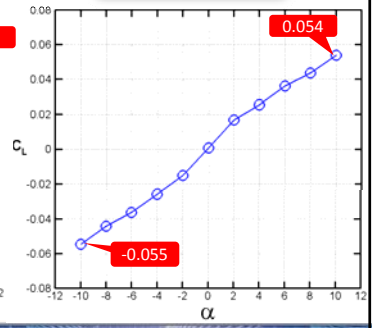
Result & Discussion

Dimensionless coefficients of lift

Wind Tunnel 10.7m/s



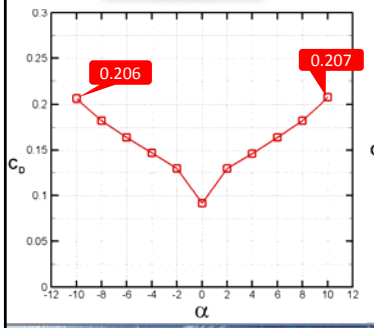
Karman-Tsien rule 208m/s，0.6M



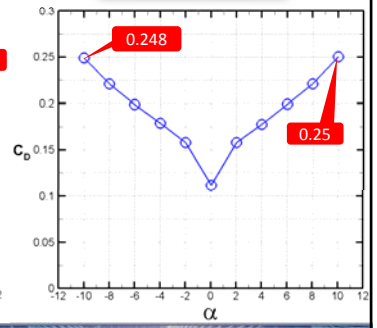
Result & Discussion

Dimensionless coefficients of drag

Wind Tunnel 10.7m/s



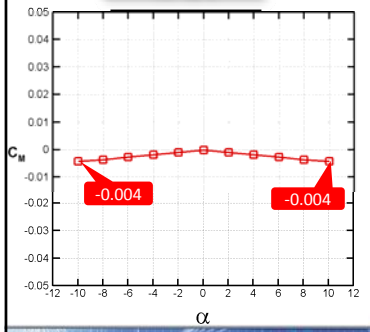
Karman-Tsien rule 208m/s，0.6M



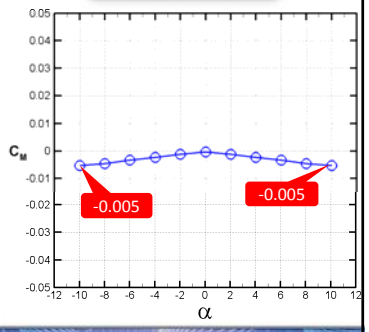
Result & Discussion

Dimensionless coefficients of pitch

Wind Tunnel 10.7m/s

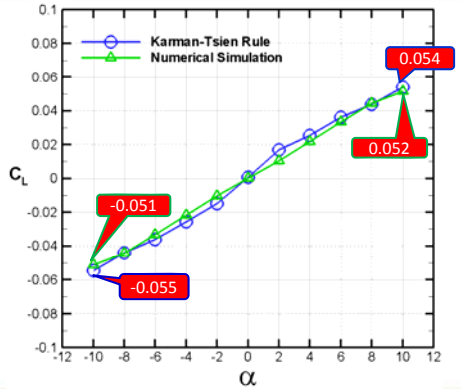


Karman-Tsien rule 208m/s，0.6M



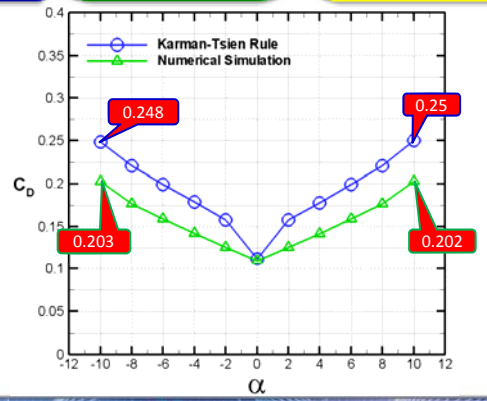
Result & Discussion

CFD coefficients of lift 0.6M α=-10°~10°



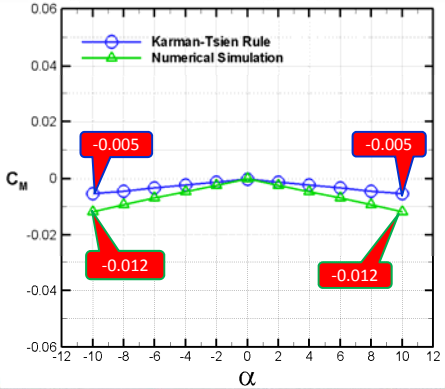
Result & Discussion

CFD coefficients of drag 0.6M α=-10°~10°



Result & Discussion

CFD coefficients of pitch 0.6M α=-10°~10°

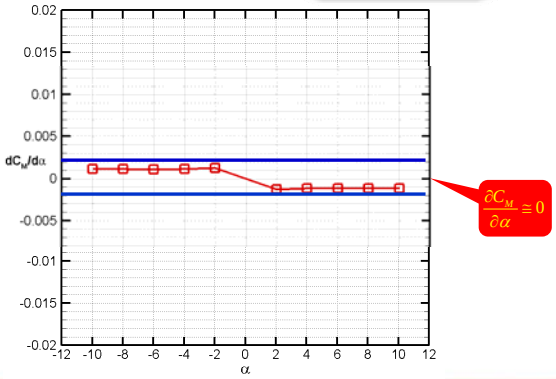


Result & Discussion

CFD

coefficients of pitch

Numerical Simulation
0.6M α=-10°~10°



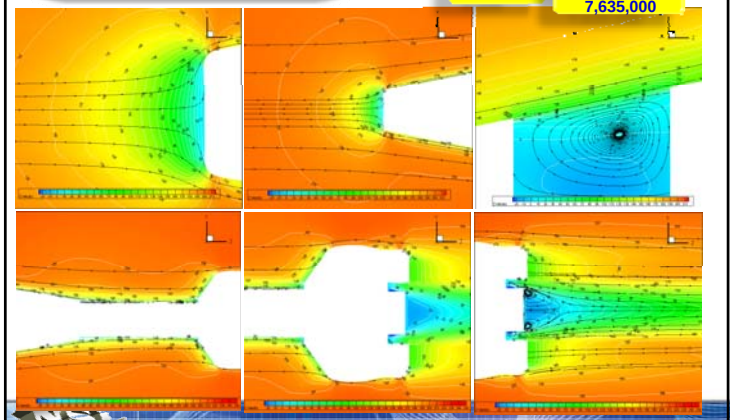
$\frac{\partial C_M}{\partial \alpha} \equiv 0$

Result & Discussion

Flow chart by Numerical Simulation

0.6M

Re= 7,095,862 、7,635,000



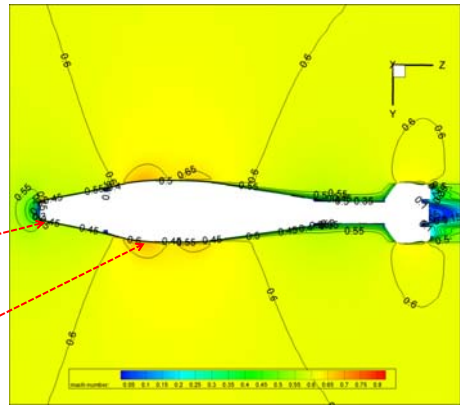
Result & Discussion

0.6M

0.6M α=-0°
Re= 7,095,862
Velocity contour

0.8M

0.65M



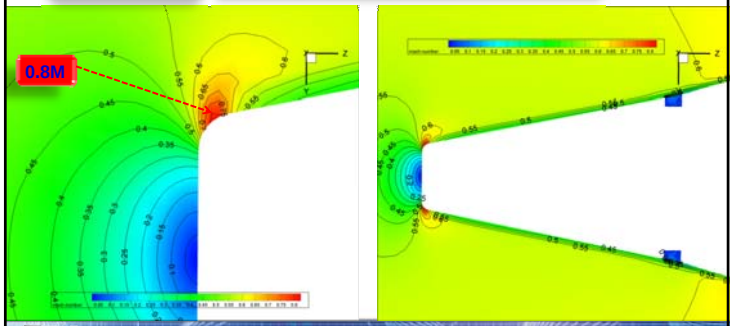
Result & Discussion

0.6M α=-0°
Re= 7,095,862

0.6M

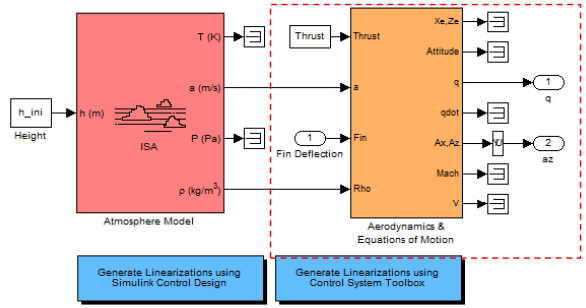
Distribution of Mach number in the Head

0.8M

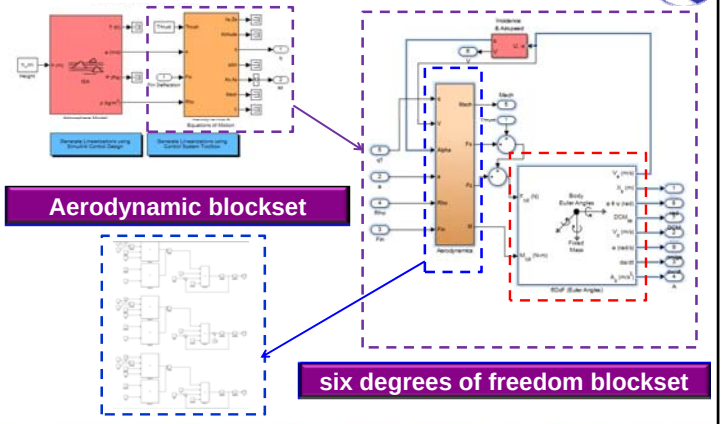


Result & Discussion

Matlab Simulink Aerospace blockset



Result & Discussion

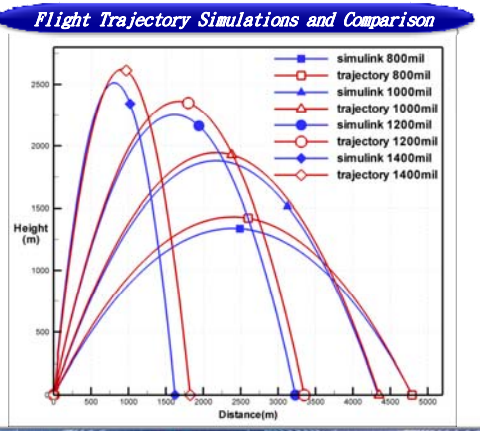


Aerodynamic blockset

six degrees of freedom blockset

Result & Discussion

Flight Trajectory Simulations and Comparison



Conclusions

low-speed wind tunnel trial data → Karman-Tsien rule → subsonic wind tunnel data

Converted experiment data C_D, C_L, and C_M α=-10°~10° — similar → Computational data C_D, C_L, and C_M α=-10°~10°

C_M remained stable in the angle of attack range of variation → $\frac{\partial C_M}{\partial \alpha} \cong 0$ → 1.Excellent aerodynamic attributes 2.flight stability

wind tunnel experiments CFD MATLAB/Simulink — reduce costs → design aerodynamic systems analyze and compare flow fields simulate flight trajectories


Thanks for your
kind attention~!
Numerical Simulation Laboratory
ICACMES, Bangkok, Thailand, June 21-22, 2013
25/24

2013 The 2nd International Conference on Automatic Control and Mechatronic Engineering

ICACME 2013

CONFERENCE SCHEDULE

Bangkok, Thailand

June 21-22, 2013

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Welcome to ICACME 2013

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The aim of ICACME 2013 is to provide a high-level international platform for researchers, engineers, as well as industrial professionals from all over the world to present their research results and development activities in the fields of Automatic Control and Mechatronic Engineering. The organizing committee of conference is pleased to invite prospective authors to participate in ICACME 2013.

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Venue

Conference venue: Pullman Bangkok King Power

8/2 Rangnam Road, Thanon-Phayathai,Ratchathewi,
Bangkok, THAILAND

Web: http://www.pullmanbangkokkingpower.com/


Located on Rangnam Road in central Bangkok. Indulge in 6 fashionable bars and restaurants, the infinity pool overlooking a botanical garden and exquisite spa. 366 rooms offer the signature Pullman bed and free WiFi throughout the hotel. Meeting facilities cater up to 600 persons. And also easy access to the **BTS skytrain near Victory Monument station** and expressway and just minutes away from Siam Square; shopping district.

The hotel is surrounded by great places to be named Aksra Theatre, VR Museum, Santiparb Park, Saxophone Pub, Suan Pakkard Palace, Four-Faces Buddha, Jatujak Weekend Market, Grand Palace, Bangkok Art and Culture Center, Jim Thompson House. Local dining and entertainment places are around the hotel.

Scan the QR code above by your mobile to log on to the venue website directly

Transportation

By Air

The Suvarnabhumi Airport is 25km away, traveling time of approximately 30 minutes by road. Donmuang Airport is 15km away, traveling time of approximately 20 minutes by road.

By Rail

Bangkok Hua Lamphong Railway Station and Hua Lamphong Railway Station are both about 9km away, approximately 15 minutes by road.

Map to Pullman Bangkok King Power for Reference

Conference Schedule

June 21, 2013(Friday)	
13:00-17:00	**Registration at the Hotel Lobby**

Note: You can also register at any time during the conference.

June 22, 2013(Saturday) in the meeting room Gamma on the 2nd Floor	
09:00—09:30	**Keynote Speech** **Prof. Mohd Zulkifly Abdullah**
09:30—10:00	**Keynote Speech** **Prof. Vinay Barhate**
10:00—10:15	**Coffee Break**
10:15—12:00	**Session 1**
12:00—13:00	**Lunch at Cuisine Unplugged Restaurant on the Ground Floor**
13:00—15:00	**Session 2**
15:00—15:15	**Coffee Break**
15:15—17:00	**Session 3**

Note:

(1) Certificate of Participation can be collected at the registration counter.

(2) Please copy PPT files of your presentation to the secretary when registration.

(3) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

Instruction for Oral Presentation

Devices Provided by the Conference Organizer:

Laptops

Projectors & Screen

Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF files

Language: English ONLY

Duration of each Presentation:

Regular Oral Session: about 10 Minutes of Presentation 5 Minutes of Q&A

Keynote Speech

June 22,2013 09:00—09:30

Keynote Speaker: Prof. Mohd Zulkifly Abdullah
Organization: Universiti Sains Malaysia
Keynote Speech Information:
Title: Computational Fluid Engineering: Applications and Challenges in Microelectronic Industries
Abstract: The trend of integrated circuits (IC) packaging toward miniaturization and diversification has emerged as a challenge in the microelectronic industry. Continuous improvement of IC packaging using conventional trial-and-error methods is time consuming and costly and these difficulties become bottlenecks in the research. The applications of computational fluid dynamics (CFD) and computational solid mechanics (CSM) in electronic packaging have helped improve IC packaging and have provided better understanding of the physicochemical aspect of the process. Moreover, fluid flow behavior such as molding compound during IC encapsulation and heating of solder reflow can be predicted through CFD/CSM simulation. The predictions give a clear visualization of fluid flow phenomenon during CFD/CSM post-processing. CFD/CSM can be used in many diverse applications. This paper provides information on CFD/CSM applications and challenges during IC encapsulation and solder reflow processes based on the substantial work done on these fields.

June 22, 2013 09:30—10:00

Keynote Speaker: Prof. Vinay Barhate
Organization: Shri Ramdeobaba College of Engineering and Management
Keynote Speech Information:
Title: Overall scenario of power system Protection using Numerical relays
Abstract: Numerical Relays emerged as the latest state of art for power system protection. In the history of 100 years of protective relays the world of power system engineers has seen many developments, thanks to Researchers. Say for example, In the Swedish ABB relay history the first protection relay type was developed in the early years of 1900 then they have delivered many millions protection and control devices throughout the world. In general the first stage was the era of electromechanical relays, which started over 100 years ago. The next era was static or electronic relays, which were introduced in the 1960s. The present era with microprocessor based relays started in the beginning of the 1980s, where microprocessor performed the logics, but the filtering was analogue. The first fully numerical relay was introduced in 1986 and since then the Numerical relays have started phasing out the conventional relays due to their flexibility, compact size, Reliability, Digital communications and multi function capability. One must look at the other side of the coin also, such as greater precision does not necessarily translate into better protection, Sometime has exposures to externally sourced transient interference, Faster decisions itself is of no value because circuit breakers are still required to interrupt at the direction of protective equipment and the ability to circuit breakers interrupt faster is very limited, lastly, its having risk of hacking since it often relies on non-proprietary Software. Now it's a challenge to overcome this limitations and making Protection systems more powerful and reliable.

Session List of Oral Presentation

Session: 1

June 22, 2013, 10:15—12:00

1.Paper id:K152

Title: GENERATING VARIOUS INVERSE TIME OVER CURRENT NUMERICAL RELAYS USING MICROCONTROLLER FOR POWER SYSTEM PROTECTION

Author: PROF. VINAY BARHATE

Abstract: Power System fault is defined as undesirable condition that occurs in the power system These undesirable conditions such as short circuit, current leakage, ground short, over current and over voltage. This paper is an attempt to design and fabricate inverse time over current protection relay using basic Microcontroller. The 8051 Microcontroller will cause the circuit breaker to trip when the current from load current reaches the setting value in the micro controller and generates a time delay for tripping as per the type of Characteristics for which it is designed, may it be IDMT or normal inverse, very inverse or extremely inverse over current Relay. First the load current need to measure in order to monitor it using current sensor and when such condition arise, it will isolate in the shortest time possible without harming the any other electrical devices. The current sensor processes the signal using current to voltage converter, precision rectifier, Analog to Digital convertor, peripheral interfacing devices with Microcontroller chip takes the suitable action of generating trip signal at appropriate time for expected pick up value of current. It is tested with laboratory setup and found working satisfactory.

2.Paper id:117

Title: Autothermal Reforming of Ethanol for Hydrogen Production: Thermodynamic Analysis

Author: Nawadee Srisiriwat,Chananchai Wutthithanyawat

Abstract: This work presents the autothermal reforming (ATR), or called oxidative steam reforming (OSR), of ethanol for hydrogen production. A thermodynamic analysis of product distribution for ATR from ethanol has been performed by using the method of Gibbs free energy minimization. The effect of steam-to-carbon (S:C) and air-to-carbon (A:C) molar ratios under adiabatic temperature of ATR reactor on chemical equilibrium composition of hydrogen rich stream is investigated. An increase of S:C ratio increases an efficiency of hydrogen production while carbon monoxide formation decreases but, however, more energy consumption for preheating reactants is also needed. An increase of A:C ratio in the range between 0 and 1.75 causes an increase of hydrogen yield but at greater A:C ratio, a decrease of hydrogen production and more water formation can be found. The results of the thermodynamic equilibrium show that the predicted hydrogen composition in the reaction of fuel-water-air system at constant temperature is higher than that obtained from experiment in both the absence and presence of catalysts in the OSR reaction when the temperature is fixed at 700 □ C. The predicted carbon monoxide is lower than that obtained from the results of non-catalytic reaction but higher than that attained from the presence of catalyst in process.

3.Paper id: 113

Title: CU-Track: A Multi-Camera Framework for Real-Time Multi-Object Tracking

Author: Pongsakon Bamrungthai,Viboon Sangveraphunsiri

Abstract: This paper presents CU-Track, a multi-camera framework for real-time multi-objecttracking.The developed framework includes a processing unit, the target object, and the multi-object tracking algorithm. APC-cluster has been developed as the processing unit of the framework to process data in real-time. To setup the PC-cluster, two PCs are connected by using PCI interface cards that memory can be shared between the two PCs to ensure highspeeddata transferand low latency. A novel mechanismfor PC-to-PCcommunication is proposed. It is realized by a dedicated software processing module called the Cluster Module. Six processing modules have been implementedto realize system operations such as camera calibration, camera synchronization and 3D reconstruction of each target. Multiple spherical objects with the same size are used as the targets to be tracked. Two configurations of them, active and passive, can be used for tracking by the system. The algorithm based on Kalman filter and nearest neighbor searchingis developed for multi-object tracking. Two applicationshave been implemented on the system, which confirm the validity and effectiveness of the developed framework.

4.Paper id:102

Title: The Research on a Rapid Appearance Detection Method for Vertical Polarized Electrolytic Capacitors

Author: Dai Min, Wang Chenyang, Chen Kai, Zhang Zhisheng

Abstract: For detecting the defects of the vertical polarized electrolytic capacitors in the process of production, an online machine vision detection method based on DSP is proposed in this paper. The hardware framework is designed emphatically with DM642 as the core processor, which has the advantages of small size, fast processing speed, low cost and low power consumption. The software workflow of the capacitors defects detection is introduced. To meet the requirement of high production and real-time detection of capacitors, a rapid appearance detection algorithm is introduced by using a few number of feature points instead of the whole. The experimental results show that the proposed method can achieve many types of defects detection of the capacitors.

5.Paper id:30

Title: Model Predictive Controller for the Flight Control of Ornithopters

Author: Md Moshiur Rahman FARAZI

Abstract: The versatile and smart feature of MPC is the ease that it can work with MIMO plants, whereas adaptive PID controller is very difficult to implement and also provides unsatisfactory results unless updated to a rather complex controller by incorporating intelligent algorithms such as Particle Swarm Optimization, Genetic Algorithm and Neural Network. In this paper we present a novel but simple Model Predicative Controller for the Flight Control of Ornithopters. The performance was evaluated for the MISO and MIMO setup for almost all possible cases of various operating conditions resulting not only in faster response but also eliminating overshoot. The results obtained from the use of Model Predictive Controller for the flight control of the Micro Arial Vehicles shows comprehensively that MPC can be used as the future means for the control of these sophisticated and very complex ornithopters.

6.Paper id:116

Title: Movable virtual wall for operation of master-slave manipulator arms

Author: Nawakorn Ditsariyakul, Viboon Sangveraphunsiri

Abstract: This research work is to develop a concept of movable virtual wall for miniature tasks operation of a master-slave manipulator arm with force reflection. The purposes are to improve

accuracy of the operation and preventing over travelling beyond a desired boundary. The predicted distance of the end-effector can be calculated based on various end-effector and hand models.From the experiments, movable virtual wall shows adjusting some wall parameters, the over travelling through the forbidden boundary can be prevented and the possibility of further development to improve miniature tasks operation.

7.Paper id:K070

Title: Improved mobile robot navigation speed based on reinforcement learning combined with Braitenberg techniques

Author: Alireza Sedaghati,SayehAlizadeh,JavadMozaffarzadeh

Abstract: Machine learning proceed asbroad and useful branch of artificial intelligence to adjust and explore of ways and algorithms that based they computers and systems are found the training and learning ability.Expanding technology-based robotics, will inevitable sagacity these machines. Therefor reinforcement learning as a powerful method for machine learning,will be Significant role in increasing the robot performance quality and improving their behaviors.In this paper, for achieve soft and efficient navigation in unknown environments for mobile robots with two fixed wheels, an algorithm is presented.This algorithm utilize combine of Braitenberg machine idea with reinforcement learning that for example is run on E-puck robot.First, the introduction of reinforcement learning is discussed,And in continuation in order to checking the efficiency of the navigation algorithm and also for that govern on the issue existent Terms and Conditions in the real world,This algorithm is considering beneficial of combination of reinforcement learning and Braitenberg techniques in Webots simulation software has been implemented and tested.also,In this study, the Matlab software has been used for implement the algorithm to the robot.

Session:2

June 22, 2013, 13:00—15:00

1.Paper id: K121

Title: Comparison Precision of Oil Film Thickness of a Hydrostatic Bearing by Using Different Controllers under External Load

Author: Ming-Chang SHIHa, Jen-Sheng SHIEb

Abstract: This paper describes a hydrostatic bearing to maintain the oil film thickness, which integrates the hydraulic servo control technology. This study has designed the different intelligent nonlinear controllers by using a non-contact displacement sensor to feedback the oil film thickness of the bearing. This study proposes a fuzzy controller, a self-tuning fuzzy controller and a self-tuning fuzzy sliding mode mechanism to modify the output scaling factor and adds a dead zone compensator to achieve a constant oil film thickness. Finally, the experimental results are used to verify the feasibility and practical implementation success of this study.

2.Paper id: 108

Title: Autothermal Reforming of Ethanol for Hydrogen Production: Steady State Modeling

Author: Chananchai Wutthithanyawat, Nawadee Srisiriwat

Abstract: As increasing hydrogen demand for fuel cell application is expected in the near future, the efficient production of hydrogen is vital enabling technology for commercialization of fuel cell for residences and automobiles. Among different technologies of hydrogen production,

autothermal reforming is considered to be thermally self-sustaining that the external heat source is not required. In this work, a steady state modeling of autothermal reforming of ethanol for hydrogen production has been performed. Because the operating condition at adiabatic temperature is designed for autothermal reformer, the estimated function of adiabatic temperature as function of steam-to-carbon (S:C) and air-to-carbon (A:C) molar ratios can be determined. At autothermal condition, the effect of S:C and A:C ratios on the product distributions of hydrogen rich stream is thermodynamically investigated. At fixed reactor pressure of 1 bar and preheat temperature of 200℃, the favorable operating condition for the autothermal reforming of ethanol is found to be a S:C ratio of 2.0 and an A:C ratio of 1.75 at adiabatic temperature of 639℃.

3.Paper id: K057

Title: The Factors to Influence the Friction Stir Welding of Aluminum Casting Semi-Solid Metal Dissimilar Joint between SSM 356 and SSM 6061

Author: Worapong Boonchouytan, Jaknarin Chatthong, Surasit Rawangwong, Romadorn Burapa, Prapas Muangjunburee

Abstract: The objective of this research is to investigate the effect of parameters on the microstructure andmechanical properties of friction stir welded butt joints of dissimilar aluminum alloy sheets between Semi-SolidMetal (SSM) 356 and 6061. The base metal of SSM 356 and 6061 was located on theadvancing side and on the retreating side, respectively. The cylindrical pin was used as the welding toolgeometry. Friction stir welded using different tool rotation speed (710, 1,000 and 1,400 rpm) and welding speed (80,112 and 160 mm/min). From investigated, the maximum average tensile strength of 175.40MPa was achievedfor the joint produced at tool rotation speed 1,400 rpm, welding speed 112 mm/min. Metallurgyandweldingstructuresoccurredof aluminumcompositematerialwillconsistof two types ofdefinitionthanthe basemetal.

4.Paper id:114

Title: Collaborated A Two-Master-Slave Manipulator Arm with Force Reflection for Defined Miniature Tasks

Author: Nuttapong Nuchprayool. Viboon Sangveraphunsiri

Abstract: This paper presents the development of a two-master-slave manipulator arm with force reflection for miniature tasks operation. The configuration of the two-master-slave arm is shown and the dynamic model of the slave arm is analyzed. The PID controller with the gravity compensation is selected for controlling desired positions of slave-tool-tips. The movements of the slave arm can be specified with coarse and fine motion. For the coarse motion, the slave arm will be moved approach to a specified workspace area with low precision but high speed. For the fine motion, the slave arm will be controlled with low speed so that the operator feels more confident to move the slave arm, through the master arm, with higher precision within the specified workspace. While operating the manipulator system, the operator can turn on/off the virtual fixture to command force reflection at the master arm for preventing a collision between the slave arm and the obstacles inside the specified working space. The experimental result is shown that the manipulator system is able to be used in miniature tasks operation with 1 millimeter precision.

5.Paper id:11

Title: The Aerodynamic Attributes and Flight Trajectories of a Tail Fin-Stabilized Projectile

Author: Chun-Chi Li, Chang-Sheng Tai, Cheng-Chyuan Lai, Shang-Min Fu,Yen-Chun Tsai

Abstract: Combined with low-speed wind tunnel experiments, this study adopted computational fluid dynamics (CFD) and the MATLAB/Simulink control software to analyze the aerodynamic attributes of a tail fin-stabilized projectile and subsequently simulate its flight trajectory with four degrees of freedom under a flight condition (M) of 0.6 and an angle of attack (α) between -60° and 60°. Comparing the CFD calculation results with the revised experiment data using the Karman-Tsien Rule showed that the aerodynamic coefficients CD, CL, and CM were similar within an angle of attack between -30° and 30°. The projectile further demonstrated excellent aerodynamic attributes within an angle of attack between -60° and 60°, maintaining stable flight. Furthermore, comparing the four-degrees-of-freedom simulation results with data from the firing table showed that the maximum height difference of trajectories at varying angles of elevation (mil) ranged from 3.07% to 4.68%, and the difference in the firing range distance ranged from 0.15% to 5.72%. To reduce the costs of field testing, this study establishes a method to design aerodynamic systems, analyze and compare flow fields, and simulate flight trajectories.

6.Paper id: 118

Title: Grinding Force Control of polishing Cubic Zirconia Gem by an Automatic Faceting Machine

Author: Chanainat Kaothong, Viboon Sangverapansiri

Abstract: This research work is to develop a controller that combines the position and indirect force control for the gemstone polishing process. The polished gemstones are attached to the end of drop-stick of the Chula Automatic Faceting Machine. The Chula Automatic Faceting Machine has 4-axis high precision motion control and the other 2-axis for spindle and crank motion. Many gemstones (number of gemstones will depends on the size of the gemstone) can be grinded and polished simultaneously with the result of uniform size and quality.

7.Paper id: 106

Title: WALKING OF A DELTA ROBOTIN IMAGE SPACE

Author: NaritBoonhaijaroen, RatchatinChancharoen

Abstract: The Delta robot with custom built eye in hand CMOS camera is successfully controlled to walk along a PCB tracethat is visually feedback. The trace, that is used to demonstrate the performance of the system, contains not only smooth but also right angle paths. However, the overall working accuracy is still within two and a half millimeters as the probe is staying on the trace all the way. The elliptic convolution scanning is proposed to determine the walking direction from an acquired image. The major and minor axes of the elliptic mask are designed to fit the walking direction and the width of the trace respectively. In this way, the elliptic mask, that is best sit on the trace in image space, indicates the direction the robot should walk. The custom built vision system acquires and processes image at 30 fps. The walking command is then sent via TCP/UDP to the Delta robot's controller which is run at a much higher servo rate (2000 Hz). The probe unit is designed and built to verify the working accuracy of the proposed system.

8.Paper id: K064

Title: A Research Method and Its Realization of Machine Tool Ergonomic Design

Author: Yu mingjiu,Yu suihuai,Ye Jun

Abstract: A design thought based on ergonomics constraint is introduced to machine tool operating components design in this paper, and a design method of machine tool operating components is researched and provided which is realized by applying database technology and Secondary development technology based a '3D entity parameterized modeling software system

platform. This method tests and verifies instrumentalizing the knowledge about industrial design and ergonomics.

9.Paper id: 127

Title: Characteristics of the Linear Piezoelectric Motor with Semi-Elliptical Stator

Author: Shine-Tzong Ho, Fu-Jie Hu

Abstract: A novel design of the semi-elliptical motor based on a double-mode type ultrasonic motor is proposed and analyzed in this paper. Due to the simplification, the semi-elliptical piezoelectric motor can be considered as an improvement of the elliptical piezoelectric motor which we have proposed in the past. The composite structure of the stator in the motor is formed by two multilayer piezoelectric actuators clamped in a semi-elliptical elastic body. In the simulation, finite element modeling of the motor is performed. The geometry of the stator has been computed with the help of the finite element analysis. Then, the dimensions of the stator's structure were determined by making the two resonance frequencies close to each other. In the experiments, the impedance and the displacement response are measured and discussed for understanding the characteristics of the linear piezoelectric motor with a semi-elliptical stator. The motor achieved maximum moving speed of 96 mm/s and the maximum output force of 0.64 N when applying a sine wave of 14Vr driving voltage at 21.2 kHz, while the maximum moving speed of 132 mm/s and the maximum output force of 0.88 N can be achieved if applying two signal driving method of the same voltage.

10.Paper id: 21

Title: SDRE Based Integrated Roll, Yaw and Pitch Controller Design for 122mm Artillery Rocket

Author: Muhammad Kashif Siddiq，Fang Jian Cheng，Yu Wen Bo

Abstract: State-dependent Riccati equation (SDRE) based controller design is an emerging trend in real world applications. This paper describes the design of an integrated roll, yaw and pitch attitude controller for a fin stabilized and canard controlled 122mm artillery rocket using SDRE technique. The rocket configuration considered is with front canards and foldable straight tail fins, and is given initial spin at the time of launch. Tails fins are deployed immediately after launch and offer high roll damping moment thereby reducing the spin rate to zero within six seconds of flight. The canards are then deployed and the roll orientation of rocket is regulated to zero with the canard deflection commands generated by the SDRE based roll autopilot. Once the roll orientation of rocket is brought to zero, the full state integrated roll, yaw and pitch autopilot comes into action. Elements of the state weighing matrix for Riccati equation have been chosen to be state dependent to exploit the design flexibility offered by the Riccati equation technique. Simulation results show significant reduction in impact point dispersion with the attitude controlled trajectory as compared to uncontrolled trajectory. Monte Carlo simulations have been performed to prove the efficacy of the proposed controller design even in the presence of wide range of deviations in rocket parameters.

Session:3

June 22, 2013, 15:15—17:00

1.Paper id: K197

Title: Robust Stability Analysis of Delay-dependence for a Class of Switched Uncertain Systems with Time Delay

Author: Chi-Jo Wang, Juing-Shian Chiou

Abstract: Some new criteria of delay-dependent stability for the switched time-delay uncertain system are deduced by employing time-switched method and the comparison theorem in this paper. The total activation time ratio of the switching law can be determined to guarantee the switched time-delay uncertain system is exponentially stable with stability margin . Finally, this method can be extended to switched interval systems with time-delay. Some examples are exploited to illustrate the proposed schemes.

2.Paper id:22

Title: The controller of DFIG power fed into the grid basing on the rotor similar signal method

Author: Thang Nguyen Trong,Ban Nguyen Tien,Hai Nguyen Hoang,Hai Nguyen Thanh

Abstract: This paper presents and analyses characteristics of the excitation control of DFIG connected to the grid basing on the rotor similar signal method. It also identifies the control object and then proposes the controllers of the active power and the reactive power of DFIG fed into grid. There are two PID controllers used to independently control the active power and the reactive power. The parameters of the PID can be changed and adjusted by the fuzzy tuner to improve the quality of system. Basing on this control system, the quality of the system is good; such as time transition and time response of this system are very small in comparison with those of the system of previous researches.

3.Paper id:107

Title: Intelligent Solar Tracker

Author: Shaikh Mohammad Fahim,Maruf Ahmed,Ahmed Rayhan Mahbub

Abstract: On the verge of exhausting fossil fuels, solar energy is the one of best options for the primary source of energy as it is renewable, eco-friendly and safe to use. An intelligent solar tracker will attempt to navigate to the best angle of exposure of the sun ensuring that the maximum amount of sunlight strikes the panel throughout the day. The main reason for pursuing this paper is to establish the idea that a tracker aided array of PV modules produces more power over a longer time than a stationary array with the same number of modules.

4.Paper id: K195

Title: A TOPSIS-BASED MULTI-CRITERIA APPROACH TO FACULTY RECRUITMENT: A CASE STUDY

Author: D. K.Behera, Asis Sarkar

Abstract: Selection of qualified faculty is a key success factor for any university. The aim of this paper is to support adequately the decision making process for those connected with the faculty selection process. The steps of fuzzy TOPSIS technique are considered, incorporating a new concept for the ranking of the alternative candidates. The candidates are judged on the following criteria's such as strategy formulation/strategic decision making capability, change management /change adaptability, communication/interpersonal skill, leadership, risk/crisis management, knowledge of software/software tools , professional experience , and educational background. Five candidates with different skills are taken for the judgment of their fate. They were asked to answer a set of questionnaires made by the experts and after that they were evaluated by the expert's board. The real life application on the selection of any executive member/post shows the practical utility of this method.

5.Paper id:111

Title: Combined Feedback and Feedforward Control for An Inertial Stabilization Systems

Author: Kritsanun Malithong, Viboon Sangveraphunsiri

Abstract: This paper presents environmental disturbance rejection in a 2-DOF inertial stabilization system by a combination of feedback and feedforward control. For feedback control, sliding mode control and the line of sight (LOS) stabilization are used for compensation of the nonlinearities, model uncertainties, friction and disturbances from outside environment. Although our mechanisms are carefully designed with statically balance, the center of the gravity will changed due to the configuration change during moving of the gimbal relative to an aerial vehicle. The disturbance torque from unbalance mass and gimbal geometry is unavoidable under the effect of the vibration of the aerial vehicle, which will lead to degrade the system's accuracy. Since the acceleration of the aerial carrier, due to the disturbance torque, can be measured, a feedforward disturbance rejection can be generated to compensate the disturbance torque. The experimental results confirm the validity of the control design procedure for the two-axis gimbaled stabilization system. The proposed controller is capable enough to overcome the disturbances and the impact of LOS disturbances on the tracking performance.

6.Paper id:K067

Title: Modeling and Workplace Analysisof 3T Cable-Driven Parallel Manipulator

Author: Guan Liwen,Mu Chenglong,Hu Yujian

Abstract: This paper analyzes the dynamic modeling and workplace of the 3T cable-driven parallel manipulator. The mechanismutilizes four cables to driven. Firstly, the kinematics equations and the inverse dynamics model were set up for the analysis. And then, pseudo-drag is a serious problem in cable-driven parallel manipulator, this paper give a method to find the workplace under the condition of pseudo-drag. Finally, through numerical simulation,the workplace of the mechanism satisfying the demand is presented by comprehensive analysis.

7.Paper id:5

Title: A Comparative Analysis of Inductors with Square and Conical Contours

Author: K. Boo Kean, Mark Ovinis,Nagarajan.T

Abstract: Winding pattern and contour are important factors in power inductors with multiple layer windings, since power inductors with multiple layers are prone to proximity effect, as multiple stacking increases the resistance stress of a conductor, eventually leading to failure of the inductor. This paper presents a comparison of winding losses for cone and square contour inductors, and discusses possible causes for the discrepancy. Conical contour inductors within a fixed core window are comparatively better than square contour winding inductors. A cross sectional analysis after winding revealed that the conical contour inductor has a gap between the conductors, indicating no melting and diffusion between layers. The absence of diffusion due to thermal degradation in conical contour winding is believed to be due to the conductor skin thickness, which is on average smaller, owing to the lower winding stresses. For a fixed dimension core and number of turns, winding losses can be reduced using a cone-shape contour compared to a square-shape contour.

8.Paper id:100

Title: Electroencephalographic Study of Essential Oils for Stress Relief

Author: Chien-Wei Liu, Ching-Sung Wang,Kai-Jen Chuang,Chia-Chi Lo,Chien-Tsu Chen

Abstract: Nowadays, electroencephalogram (EEG) is widely used in medical applications. Besides the examination for brain diseases, EEG is used to observe how the surroundings affect people's emotion. There are many essential oils, and most claim that they are effective in soothing soul and calming. Currently, there is no related EEG scientific experiment to verify this

claim, This study attempted to understand whether common essential oils for stress relief have actual emotional relaxation effects on the human brain by EEG observation; the level of efficacy was also observed. From the results of this study, rose essential oil had the best effect of stress relief and relaxation in both genders ($P<0.05$). It suggested that peppermint essential oil had the best effect of relaxation in male ($P<0.05$) and rose essential oil had the best effect of relaxation in females ($P<0.05$) when it was analyzed by gender.

9. Paper id: K062

Title: Static Analysis of Double-edged Rock-breaking Hob Based on Finite Element

Author: Lida Zhu,Wenwen Liu,Chunguang Liu,Pengcheng Su,Tianhua Wei

Abstract: Double-edged hob is commonly used as a tunneling tool when the shield machine works and it is easy to failure due to its insufficient strength in the rock breaking process. In order to solve this problem, the paper used the theory of finite element to do static simulation analysis of the hob. Firstly, the paper generated a three-dimensional model by using the software Pro/E based on a constant cross section double-edged cutter. Then, the maximum stress, maximum strain and their distributions on the double-edged hob could be obtained from static analysis based on the finite element analysis software ABAQUS. Finally, we could get the conclusion that double-edged hob met strength requirements in the test load conditions by comparing the maximum stress and yield strength of hob material. The results of static simulation analysis provided reference to material selection and optimization design of the double-edged hob and cutter head.

Note: If you would like to deliver oral presentation but your paper is not in the session list, please contact us by Email:cfp@icacme.org ASAP. Thanks again for all your great attention and kind support to ICACME2013.

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CERTIFICATE OF BEST PAPER

The committee of **The 2nd International Conference on Automatic Control and Mechatronic Engineering (ICACME2013)** does certify that

Paper ID: 11

Title:The Aerodynamic Attributes and Flight Trajectories of a Tail Fin-Stabilized Projectile

Authors/Author: Chun-Chi Li, Chang-Sheng Tai, Cheng-Chyuan Lai, Shang-Min Fu, Yen-Chun Tsai

has been assessed by the committee of ICACME 2013 as the Best Paper Award. Congratulations!

Signed by _____

Date June 22, 2013

ICACME2013

Certificate of Participation

This is to Certify that Chun-Chi Li, from CCIT, NDU, Taiwan, ROC have participated and delivered an oral presentation in the 2013 The 2nd International Conference on Automatic Control and Mechatronic Engineering (ICACME2013) in Bangkok during Jun. 21-22 , 2013.

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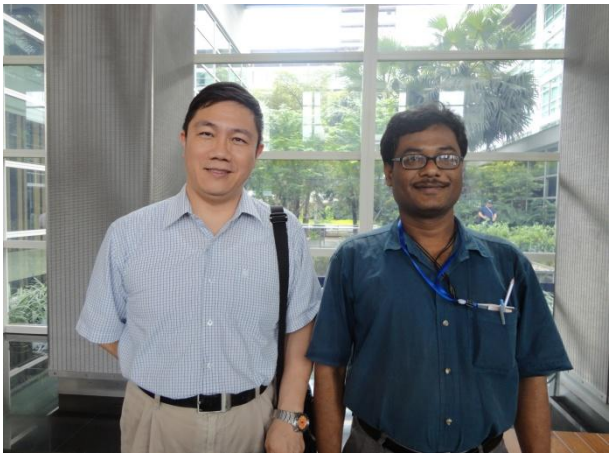

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