Submitted to **2nd International Symposium on Sustainable Chemical Product and Process Engineering**

Exergy analysis and multi-objective optimization of direct methanol fuel cell system

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Abstract

The exergy analysis and optimum operating strategy for a non-isothermal direct methanol fuel cell (DMFC) system is carried out in this work. With consideration of permeated methanol burned at the cathode, the improvement of fuel efficiency and total exergetic efficiency is characterized as a multi-objective optimization problem. To solve incommensurable multiple goals, the fuzzy inference with two-phase procedures is applied for finding the locally Pareto-optimal solution. Through an iterative optimization programming, a piecewise optimal control action is effectively generated by the proposed algorithm at each time period. Finally, the simulation shows that a compromise operating manner can ensure some degree of fuel and exergetic efficiencies under physical constraints.

Keywords: Multi-objective optimization; Fuzzy; Exergy; Direct methanol fuel cell; Simulation

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