International Journal of Innovative Computing, Information and Control
Volume **5**, Number **12(B)**, December **2009**

ICIC International ©2009 ISSN 1349-4198
pp. 4765–4774

NEURAL NETWORK MODELING FOR SMALL DMFC BIPOLAR PLATE STACK SYSTEM

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Received July 2008; revised December 2008

Abstract. *Since the multitudinous parameters make the DMFC model become a complex "black-box", direct methanol fuel cell (DMFC) modeling has become an important and difficult issue of practical experiment. This paper presents the model of the small DMFC Bipolar Plate Stack System. This system is different from the conventional complex mathematical models by the neural network (NN) which is considered the real parameters of the measurement inputs and outputs. First, the training data is the power density of short-term stability tests for the DMFC 10-cell stacks. Then, the DMFC model can be obtained by NN method and contented to the different unit cell stacks. Finally, the simulation results in agreement with experimental results show that the NN modeling method effectively projects the power density on small DMFC packs, such as the development and simulation tool. Therefore, the NN modeling method can save much time to reform the conventional mathematical models by the very expensive experiment.*
Keywords: Fuel cell, Membrane electrode assembly, Neural network

1. **Introduction.** The advantages, environmental friendliness, practically noise-free operation and very high efficiency, make fuel cells a very sound competitor on the future electricity markets. Recent advances in the fuel cell technology significantly improve the technical and economical characteristics of this technology [1-7]. Amid various kinds of fuel cells, the direct methanol fuel cell (DMFC) technology which is considered to be a promising candidate for portable power sources uses liquid methanol directly without a reformer because methanol has a higher specific energy (about 6000Wh/kg) than lithium-ion batteries (approximately 200Wh/kg) [11] and can be operated at ambient conditions with potential for use in portable electronic devices such as notebooks, mobile phones and other advanced mobile electronic devices. Bipolar plate stack is a kind of the fuel