质子交换膜燃料电池三维性能数值仿真

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摘要：采用 CFD Research Corporation(CFDRC) Ver. 2003 软件进行模型的建立及数值求解。比较了不同流道设计对电池性能的影响。结果发现：在低操作电压下，气体补充速度比反应速度慢，容易产生浓度极化；栅状流道的气体分布非常不均匀，也会有传质极限的现象发生。蛇行流道的气体分布较均匀，传质也较好，性能比栅状流道好。

关键词：质子交换膜燃料电池；栅状流道；蛇行流道；传质极限

中图分类号：TM911.4　文献标识码：A　文章编号：1001-1579(2004)03-0229-03

Numerical analysis of PEMFC performance

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Abstract: Prediction of PEMFC gas concentration in mass transfer area and chemical reaction area were performed with CFD Research Corporation (CFDRC)Ver.2003 software. The influence of fuel cell performance with various flow channel design were studied. The results indicated that the gas compensation speed was lower than the reaction speed at low operating voltage, created the limit of mass transfer. The gas concentration of the straight flow pattern appeared excessive non-uniformity, created a mass transfer limit. On the other hand, the gas concentration was well distributed for the serpentine flow pattern, created better mass transfer phenomena.

Key words: PEMFC；straight flow pattern；serpentine flow pattern；mass transfer limit