能源和环境工程

常规流场质子交换膜燃料电池阴极二维两相流模型

胡军，衣宝廉，才英华，张华民

中国科学院大连化学物理研究所燃料电池工程中心，辽宁 大连 116023

摘要　　对采用常规条形流场的H_2-Air PEMFC阴极建立了二维两相流模型，控制方程耦合了电传导方程、O_2和气态H_2O的对流-扩散方程、多孔介质连续性方程以及液态H_2O输运方程. 利用模型计算了阴极扩散层中O_2浓度、气态H_2O浓度、电流密度以及液态水饱和度的分布，分析了扩散层中H_2O的传递方式及各组分浓度分布的特点.

关键词　　质子交换膜燃料电池　两相流　数值模拟　条形流场

分类号

TWO-DIMENSIONAL, TWO-PHASE MODEL FOR CATHODE OF PROTON EXCHANGE MEMBRANE FUEL CELL WITH CONVENTIONAL FLOW FIELD

HU Jun,YI Baolian,CAI Yinghua,ZHANG Huamin

Abstract

　The two dimensional，　two-phase mathematical model was developed for the cathode of proton exchange membrane fuel cell with conventional flow field operated with air. The governing equations included conductive equation, continuity equation in porous media, the convection-diffusion equations for O_2 and water vapor, and the transfer equation for liquid water.The concentration of O_2 and water vapor, the current density and liquid water saturation in the diffuser were calculated.The mechanism of H_2O transport in the cathode diffuser and the gaseous species concentration distribution in the diffuser were studied.

Key words　proton exchange membrane fuel cell　two-phase flow　simulation　conventional flow field

DOI:

通讯作者　胡军 hujun@dicp.ac.cn

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