数学与系统科学研究院

计算数学所定期学术报告

报告人：　　**Dr. Pengtao Sun**

（ ***Department of Mathematical Sciences, University of Nevada Las Vegas, USA*** ）

报告题目：

Modeling and numerical studies for a two-phase transport model of polymer electrolyte membrane fuel cell

邀请人：　　胡齐芽 研究员

报告时间：**2012** 年 **6** 月 **21** 日（周四）

下午 **16：00-17：00**

（**15：30~16：00** 茶歇）

报告地点：　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

In this talk, an efficient numerical method for a three-dimensional, two-phase transport model is presented for polymer electrolyte membrane fuel cell (PEMFC) including multi-layer diffusion media, composed of two or more layers of porous materials having different pore sizes and/or wetting characteristics. Particularly, capillary pressure is continuous, whereas liquid saturation is discontinuous, across the interface of gas diffusion layer (GDL) and micro-porous layer (MPL), which can improve liquid-water transport in the porous electrode. We design a nonlinear Dirichlet/Robin iteration-by-subdomain Schwarz-domain decomposition method to deal with water transport in such multi-layer diffusion media, where Kirchhoff transformation and its inverse techniques are employed to conquer the discontinuous water diffusivity in the coexisting single- and two-phase regions. In addition, the conservation equations of mass, momentum, charge, hydrogen and oxygen transport are numerically solved by a combined finite element-upwind finite volume method. Numerical simulations demonstrate that the presented techniques are effective to obtain a fast and convergent nonlinear iteration for a 3D full PEMFC model within around a hundred steps. A series of numerical convergence tests are carried out to verify the efficiency and accuracy of our numerical algorithms and techniques.

欢迎大家参加！