

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Xiaoming He**

*(Department of Mathematics & Statistics, Missouri University of
Science & Technology, USA)*

报告题目:

**Multi-physics domain decomposition
methods for Stokes-Darcy model**

邀请人: 许学军研究员

报告时间: **2011 年 7 月 11 日 (周一)**

上午 10: 00-11: 00

报告地点: **科技综合楼三层 311**

计算数学所报告厅

Abstract:

The Stokes-Darcy model arises in many interesting real world applications, including groundwater flows in karst aquifers, interaction between surface and subsurface flows, industrial filtrations, oil reservoir in vuggy porous medium, and so on. This model describes the free flow of a liquid by the Stokes or Navier-Stokes equation and the confined flow in a porous media by the Darcy equation; the two flows are coupled through interface conditions. For the problems mentioned, the resulting coupled Stokes-Darcy model has higher fidelity than either the Darcy or Stokes systems on their own. However, coupling the two constituent models leads to a very complex system.

This presentation discusses multi-physics domain decomposition methods for solving the coupled Stokes-Darcy system. Robin boundary conditions based on the physical interface conditions are utilized to decouple the Stokes and Darcy parts of the system. A parallel iterative domain decomposition method is first constructed for the steady state Stokes-Darcy model with the Beavers-Joseph interface condition. Then two parallel non-iterative domain decomposition methods are proposed for the time-dependent Stokes-Darcy model with the Beavers-Joseph-Saffman interface condition. Numerical examples are presented to illustrate the features of these methods and verify the theoretical results.

欢迎大家参加!