数学与系统科学研究院

计算数学所定期学术报告

报告人：**Associate Prof. Xiaoming He**

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报告题目：

Dual-porosity-Stokes model and finite element method for coupling dual-porosity flow and free flow

邀请人：　龚伟副研究员

报告时间：**2017** 年 **12** 月 **21** 日（周四）

下午 **16:00--17:00**

报告地点：　数学院思源楼

一层报告厅

报告摘要：

We propose and numerically solve a new model considering confined flow in dual-porosity media coupled with free flow in embedded macro-fractures and conduits. Such situation arises, for example, for fluid flows in hydraulic fractured tight/shale oil/gas reservoirs. The flow in dual-porosity media, which consists of both matrix and micro-fractures, is described by a dual-porosity model. And the flow in the macro-fractures and conduits is governed by the Stokes equation. Then the two models are coupled through four physically valid interface conditions on the interface between dual-porosity media and macro-fractures/conduits, which play a key role in a physically faithful simulation with high accuracy. All the four interface conditions are constructed based on fundamental properties of the traditional dual-porosity model and the well-known Stokes-Darcy model. The weak formulation

is derived for the proposed model and the well-posedness of the model is analyzed. A finite element semi-discretization in space is presented based on the weak formulation and four different schemes are then utilized for the full discretization. The convergence of the full discretization with backward Euler scheme is analyzed. Four numerical experiments are presented to validate the proposed model and demonstrate the features of both the model and numerical method, such as the optimal convergence rate of the numerical solution, the detail flow characteristics around macro-fractures and conduits, and the applicability to the real world problems.

欢迎大家参加！