数学与系统科学研究院

计算数学所学术报告

报告人：Dr. Guanglian Li

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报告题目：

Multiscale Model Reduction to Flow Problems with High-Contrast Heterogeneous Random Coefficient

邀请人： 龚伟 副研究员

报告时间：2018 年 4 月 9 日（周一）

下午 16:00--17:00

报告地点：数学院科技综合楼

Z311 报告厅

报告摘要：

This talk is concerned with deriving the efficient numerical methods for flow problems with high-contrast heterogeneous random coefficients,

which arise from many applications, for example, reservoir simulation and material science. In specific, we are interested in two types of model order reduction: the truncation estimate with respect to the random variables and the multiscale model reduction. There are many approaches to arrive at the truncation estimate in the literature, including the polynomial chaos expansion, the localized wavelets expansion and the Karhunen-Lo´eve (KL) expansion. Here, we will stick to the Karhunen-Lo´eve (KL) expansion which yields the optimal truncation estimate in the mean square error. The numerical estimate for KL expansion will be examined in details. Next, we will present the efficient numerical methods for solving the flow problem with each realization of the random coefficient. This is realized by multiscale analysis. We will present the construction of local multiscale basis functions, the randomized snapshot algorithm and the adaptive GMsFEM algorithm. Finally, I will close my talk with a brief discussion on the optimality of local multiscale basis functions.

References：

[1] Griebel and GL,preprint, 2017.

[2] Griebel and GL, to appear SIAM J. Numer. Anal., 2017.

[3] GL, to appear SIAM Multiscale Model Simul., 2017.

[4] GL, submitted, 2018.

[5] Calo, Efendiev, Galvis and GL, SIAM Multiscale Model Simul., 2016.

[6] Chung, GL and Efendiev, J. Comput. Phys, 2014.

欢迎大家参加！