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GMsFEM for Reduced Model of Darcy Flow in Fractured Porous Media

Wednesday, 2 June 2021 18:50 (15 minutes)

In This work, we combine Generalized Multiscale Finite Element Method (GMsFEM) with a reduced model based on Discrete Fracture Model (DFM) to resolve the difficulties of simulating fluid flow in fractured porous media while efficiently and accurately reduce the computational complexity resulting from resolving the fine scale effects of the fractures. The geometrical structure of the fractures is discretely resolved within the model using DFM. The advantage of using GMs- FEM is to represent the fracture effects on a coarse grid via multiscale basis functions constructed using local spectral problem. Solving local problem leads to consider small scale information in each coarse grid. On another hand, the multiscale basis functions, generated following GMsFEM framework, are parameter independent and constructed once in what we call it offline stage. These basis functions can be re-used for solving the problem for any input parameter when it is needed. Combining GMsFEM and DFM has been introduced in other works assuming continuous pressure across the fractures interface. This continuity is obtained when the fractures are much more permeable than that in the matrix domain. In this work, we consider a general case for the permeability in both fracture and matrix domain using the reduced model presented in [3]. The proposed reduction technique has significant impact on enabling engineers and scientist to efficiently, accurately and inexpensively solve the large and complex system resulting from modeling flow in fractured porous media.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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Primary author: Dr ALOTIBI, Manal

Co-authors: Dr CHEN, Huangxin (School of Mathematical Sciences and Fujian Provincial Key Laboratory on Mathematical Modeling and High Performance Scientific Computing, Xiamen University, Fujian, China); Prof. SUN, Shuyu (Computational Transport Phenomena Laboratory, Division of Physical Science and Engineering, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia)

Presenter: Dr ALOTIBI, Manal

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