

Least squares mixed Generalized multiscale finite element method

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In this talk, a least-squares mixed generalized multiscale finite element method (GMsFEM) is proposed to solve flow problems in highly heterogeneous porous media. The goal is to construct multiscale basis functions for both pressure and velocity simultaneously. We will apply the framework of GMsFEM, and design systematic strategies for the construction of basis. The problem is formulated in a least-squares mixed form, for which compatibility condition for the pressure and velocity spaces is not required. This significantly enhances the flexibility to choose multiscale basis functions. A flux correction technique is developed to obtain the velocity with local mass conservation. The method can give accurate solutions for both pressure and velocity with the use of only a few basis functions per coarse element. Convergence results will be presented. Some numerical examples will illustrate the performance of the least-squares mixed GMsFEM.