

A Domain Decomposition Preconditioner for a Discontinuous Petrov-Galerkin Method

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ABSTRACT

In this talk we will discuss a domain decomposition preconditioner for a discontinuous Petrov-Galerkin (DPG) method for the Poisson problem. Theoretical results on the condition number estimate of the preconditioned system will be presented along with numerical results.

The DPG methods are based on an ultraweak formulation, which are discontinuous Galerkin methods with interesting properties. The DPG method has good stability properties due to use of optimal test functions in a similar manner to least-square Galerkin methods. But, differently from least-square Galerkin methods, the DPG method allows for use of optimal test functions at a reasonable computational cost because the test functions can be solved locally. On the other hand, solution of the resulting ill-conditioned linear system for the DPG method is a challenge. We will propose an additive Schwarz preconditioner for the linear system resulting from the DPG discretization and explore its effectiveness in terms of its theoretical properties and practical efficiency.

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