

A robust DPG method for large domains

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Abstract

We observe a dramatic lack of robustness of the DPG method when solving problems on large domains and where stability is based on a Poincaré-type inequality. We show how robustness can be re-established by using appropriately scaled test norms. As model cases we study the Poisson problem and the Kirchhoff–Love plate bending model, and also include fully discrete variants where optimal test functions are approximated. Numerical experiments for both model problems, including an-isotropic domains and mixed boundary conditions, confirm our findings.

Keywords

Discontinuous Petrov–Galerkin method; Optimal test functions; Locking phenomena; Plate bending; Ultraweak formulation.