

Optimization of the penalty parameter for the dual-wind discontinuous Galerkin methods on a prototypical second order PDE.

Abstract

A discontinuous Galerkin (DG) finite-element interior calculus is used as a common framework to describe various DG approximation methods for second-order elliptic problems. The dual-wind discontinuous Galerkin method (DWDG) has been shown to be stable and consistent for a wide range of penalty parameter values, including zero, for second order elliptic problems under certain mesh conditions. In this presentation, we will present the results of numerical experiments on various second order elliptic problems with varying penalty parameters that show the choice of zero for the penalty parameter is an optimal choice for application.