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## Robust DPG method for convection-dominated diffusion problems \*

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### Abstract

We propose and analyze a DPG method for convection-dominated diffusion problems which provides robust  $L^2$  error estimates for the field variables, and which are quasi-optimal in the energy norm. Key feature of the method is to construct test functions defined by a variational formulation with bilinear form (test norm) specifically designed for the goal of robustness. Main theoretical ingredient is a stability analysis of the adjoint problem. Numerical experiments underline our theoretical results and, in particular, confirm robustness of the DPG method for well-chosen test norms.

**Key words:** convection-dominated diffusion,  $hp$ -adaptivity, discontinuous Petrov Galerkin method

**Mathematics subject classifications (1991):** 65N30, 35L15

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