Ern, Alexandre; **Stephansen, Annette F.**; **Zunino, Paolo**

A discontinuous Galerkin method with weighted averages for advection-diffusion equations with locally small and anisotropic diffusivity. (English) Zbl 1165.65074

IMA J. Numer. Anal. 29, No. 2, 235-256 (2009).

The authors consider a homogeneous Dirichlet boundary value problem for 2D and 3D advection-diffusion equations with anisotropic and discontinuous diffusivity. They introduce a symmetric weighted interior penalty scheme in the well known framework of the discontinuous Galerkin method in order to remove the difficulties induced by locally small diffusivity (high Peclet number). They prove energy convergence results which are optimal with respect to mesh size and robust with respect to diffusivity. Some numerical examples are carried out in order to underline the effectiveness of the scheme.

Reviewer: Calin Ioan Gheorghiu (Cluj-Napoca)

MSC:

65N30	Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs	Cited in **60** Documents
65N12	Stability and convergence of numerical methods for boundary value problems involving PDEs	
65N15	Error bounds for boundary value problems involving PDEs	
35J25	Boundary value problems for second-order elliptic equations	

Keywords:

discontinuous Galerkin method; weighted averages; locally small diffusion with advection; anisotropic diffusion; convergence; advection-diffusion equations; interior penalty scheme; high Peclet number; numerical examples

Full Text: DOI