

**Gopalakrishnan, J.; Kanschat, G.**

**A multilevel discontinuous Galerkin method.** (English) Zbl 1044.65084  
Numer. Math. 95, No. 3, 527-550 (2003).

With extended references to the major papers on the subject, this work analyzes mathematically multigrid techniques for two discontinuous Galerkin methods: one for elliptic problems and a second one for singular perturbed advection-diffusion problems. In the former case, the analysis predicts convergence rates of the multigrid method independent of the mesh size. In both cases, theoretical results are supported by numerical experiments.

Reviewer: [Michel Bernadou \(Paris La Defense\)](#)

**MSC:**

- [65N30](#) Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
- [35J25](#) Boundary value problems for second-order elliptic equations
- [65F10](#) Iterative numerical methods for linear systems
- [65N55](#) Multigrid methods; domain decomposition for boundary value problems involving PDEs
- [65F35](#) Numerical computation of matrix norms, conditioning, scaling
- [35B25](#) Singular perturbations in context of PDEs
- [65N12](#) Stability and convergence of numerical methods for boundary value problems involving PDEs

Cited in **1** Review  
Cited in **70** Documents

**Keywords:**

elliptic boundary value problems; advection-diffusion equations; interior penalty finite element method; discontinuous Galerkin method; multigrid technique; singular perturbation; convergence; numerical experiments

**Full Text:** [DOI Link](#)