Goal-oriented Anisotropic Mesh Adaptation Method for Linear Convection-diffusion-reaction Problems

Vit Dolejsi
Charles University, Prague
dolejsi@karlin.mff.cuni.cz

Abstract

We deal with the numerical solution of linear convection-diffusion-reaction equation using the discontinuous Galerkin method on anisotropic triangular grids. We derive a posteriori goal-oriented error estimates taking into account the anisotropy of mesh elements. We start from the standard *dual weighted residual* (DWR) formula and the "weights" terms are further estimated by technique from [1]. The higher order reconstruction is a key aspect of goal-oriented estimation and adaptation. We use a *least square reconstruction* from [2] which works reasonably for all tested polynomial approximation degrees. The resulting error estimates are employed for the anisotropic mesh adaptation algorithm where the optimal anisotropy of mesh element is sought by a simple adaptive iterative algorithm. The efficiency, accuracy and robustness of the mesh adaptation algorithm is demonstrated by several numerical experiments. Finally, an extension to the *hp*-variant is presented.

References

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