EFFICIENT SIMULATION OF CONVECTION DIFFUSION EQUATIONS

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Abstract

In this talk we address efficient methods for the discretization of convection diffusion equations. Efficiency is obtained by using grid adaptive discretization schemes on parallel computers. We will discuss recent results of a posteriori error estimates for convection diffusion equations on the one hand [3], [4], [5], [6], [7], and present generic implementation concepts within the software environment DUNE on the other hand [1], [2].

References

[1] A. Burri, A. Dedner, D. Diehl, R. Klöfkorn, and M. Ohlberger, *A general object oriented framework for discretizing nonlinear evolution equations*, Proceedings of The 1st Kazakh-German Advanced Research Workshop on Computational Science and High Performance Computing, Almaty, Kazakhstan, September 25 - October 1, 2005, 2005.

[2] A. Burri, A. Dedner, R. Klöfkorn, and M. Ohlberger, *An efficient implementation of an adaptive and parallel grid in DUNE*, Proceedings of The 2nd Russian-German Advanced Research Workshop on Computational Science and High Performance Computing, Stuttgart, March 14 - 16, 2005.

[3] A. Dedner, C. Makridakis, and M. Ohlberger, *Error control for a class of Runge Kutta Discontinuous Galerkin methods for nonlinear conservation laws*, SIAM J. Numer. Anal., 45 (2007), pp. 514–538.

[4] B. Haasdonk and M. Ohlberger, *Reduced basis method for finite volume approximations of parametrized evolution equations*, Preprint 06-12, Mathematisches Institut, Freiburg, 2006.

[5] D. Kröner and M. Ohlberger, *A-posteriori error estimates for upwind finite volume schemes for nonlinear conservation laws in multi dimensions*, Math. Comp., 69 (2000), pp. 25–39.

[6] M. Ohlberger, *A posteriori error estimates for vertex centered finite volume approximations of convection-diffusion-reaction equations*, M2AN Math. Model. Numer. Anal., 35, 2 (2001), pp. 355–387.

[7] M. Ohlberger and J. Vovelle, *Error estimate for the approximation of non-linear conservation laws on bounded domains by the finite volume method*, Math. Comp., 75 (2006), pp. 113–150.