Block-Jacobi Preconditioners for Advection Problems

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Abstract

We present an a class of block-Jacobi preconditioners for advection-dominated problems. We discuss its construction and application for various discretization schemes including high-order discontinuous Galerkin discretizations on hexahedral meshes with tensor product basis functions. We form the element-wise inverses based on the fast diagonalization method for an approximation of the cellwise problem by constant coefficients on a Cartesian mesh. In order to overcome the degradation of the cellwise inverse when the transport speed is highly variable, we analyze cellwise iterative solvers.

This talk is based on joint work with Martin Kronbichler and Katharina Kormann of the Ruhr University Bochum, Germany.