

A fast and accurate method for grid deformation

Matthias Grajewski¹ Stefan Turek²

In the context of hardware-oriented numerics, grid deformation, e.g. the relocation of grid points preserving the topology of the mesh, is a viable way for grid adaption and offers an alternative to the widespread h-adaptivity. We present a fast and accurate grid deformation method which -unlike many common approaches to grid deformation- works independently of the underlying problem and thus acts as black-box tool. It requires the solution of one global Poisson problem and one ODE for each grid point only. We show the convergence of our method. Moreover, exploiting the given grid hierarchy, this grid deformation method is of almost optimal complexity with respect to the number of vertices in the mesh.

¹University of Dortmund, Institute of Applied Mathematics, Vogelpothsweg 87, 44221 Dortmund, Germany,

matthias.grajewski@mathematik.uni-dortmund.de

²University of Dortmund, Institute of Applied Mathematics,
Stefan.Turek@mathematik.uni-dortmund.de