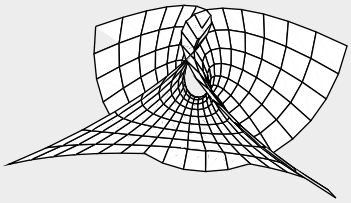

Oberseminar Mathematische Strömungsmechanik

Institut für Mathematik der Julius-Maximilians-Universität Würzburg

Hyperbolic equations - structure preserving methods & other topics

Dmitri Kuzmin

Dortmund University, Germany

Monolithic convex limiting and entropy fixes for finite element discretizations of hyperbolic problems

Abstract:

This talk presents a new kind of flux limiters for finite element discretizations of nonlinear hyperbolic problems. The proposed methodology is based on an algebraic splitting of a high-order semi-discrete scheme into a low-order approximation of local Lax-Friedrichs type and an antidiffusive correction term. The latter is decomposed into numerical fluxes, which are limited to preserve relevant properties of the low-order scheme. Preservation of local and/or global bounds for scalar quantities of interest is enforced using monolithic convex limiting, a flux correction procedure based on representation of spatial semi-discretizations in terms of admissible intermediate states. Additional limiting is performed to satisfy Tadmor's entropy stability conditions and inequality constraints for fully discrete schemes. The benefit of each correction step is illustrated by numerical examples for scalar equations and hyperbolic systems. The main focus of this presentation is on continuous P1/Q1 Lagrange approximations but extensions to discontinuous Galerkin methods and high-order finite elements are available as well.

This is joint work with H. Hajduk, M. Quezada de Luna, and A. Rupp.

via Zoom video conference (request the Zoom link from klingen@mathematik.uni-wuerzburg.de)

Friday, Oct. 22 at 3 pm CET

Zu diesem Vortrag sind Sie herzlich eingeladen.

gez. Christian Klingenberg