Opleiding Werktuigbouwkunde

Universiteit Twente
de ondernemende universiteit

COLLOQUIUM

Conform artikel 4.6.8 van het SSNS-wb.

Vakgroep: **Technische Stromingsleer**

In het kader van zijn doctoraalopdracht zal

David J. Lopez Penha

een voordracht houden getiteld:

A High-Order Projection Scheme for One-Dimensional Wave Propagation

Datum: 25 januari 2008

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Summary:

In Computational Aeroacoustics (CAA), high-order schemes for wave propagation typically require large stencils and therefore command special attention at near-boundary regions. The discontinuous Galerkin (DG) formulation provides a very compact scheme and is ideally suited for all mesh types and boundary value problems.
Spatial discretization errors associated with plane-wave solutions of the one-dimensional linear advection equation are analyzed with a DG method. Local eigenspectrum analysis indicates a leading dissipation rate of $O((k\Delta x)^{2p+2})$. It will be shown in general, but explicitly for polynomial approximations of degree p = {1,2}, that the dissipation rate can be improved to $O((k\Delta x)^{2p+6})$. Also, a direct link is found between improving the dispersion rate beyond that of the standard DG method and the stability of the local spurious eigenmodes. A new set of optimized system coefficients can be defined through proper eigenspectrum/-eigenvector equations. Furthermore, superconvergence of the global discretization errors are shown to be attainable at arbitrary, fixed grid points through a pointwise solution expansion in the system's physical eigenvector.

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