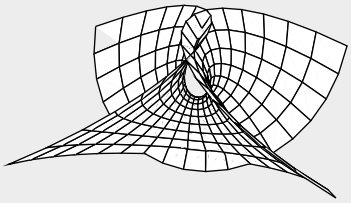

Oberseminar Mathematische Strömungsmechanik

Institut für Mathematik der Julius-Maximilians-Universität Würzburg

Hyperbolic equations - structure preserving methods & other topics

Randall LeVeque

Univ. of Washington in Seattle, Italy

Dispersive Tsunami Modeling with Adaptive Mesh Refinement

Abstract:

The open source GeoClaw software (distributed as part of Clawpack) implements the two-dimensional shallow water equations (SWE) over topography in a well-balanced manner, and is widely used for modeling tsunamis, storm surge, river flooding, and other natural hazards over large spatial extents. Adaptive mesh refinement (AMR) is heavily used in most applications, e.g. to efficiently track a tsunami across the ocean and then zoom in to meter-scale resolution in a coastal region of interest, where inundation is modeled by robust wetting-and-drying algorithms.

For many applications the SWE are a good model, e.g. for large earthquake-generated tsunamis with a long wavelength relative to the ocean depth. For shorter wavelength phenomena (e.g. tsunamis generated by landslides or asteroid impacts), the SWE do not properly capture the dispersive nature of the waves. In recent joint work with Marsha Berger, a version of depth-averaged Boussinesq equations have been implemented in GeoClaw to better model such phenomena. The primary difficulty is that the higher-order derivatives in this model require implicit solvers, which are more challenging to implement in an efficient and stable manner in the context of AMR than the explicit finite volume methods used for SWE. I will discuss these issues and show some computational results obtained as part of the NASA-funded Asteroid Threat Assessment Project.

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

Friday, May 6 at 3 pm CET

Zu diesem Vortrag sind Sie herzlich eingeladen.

gez. Christian Klingenberg