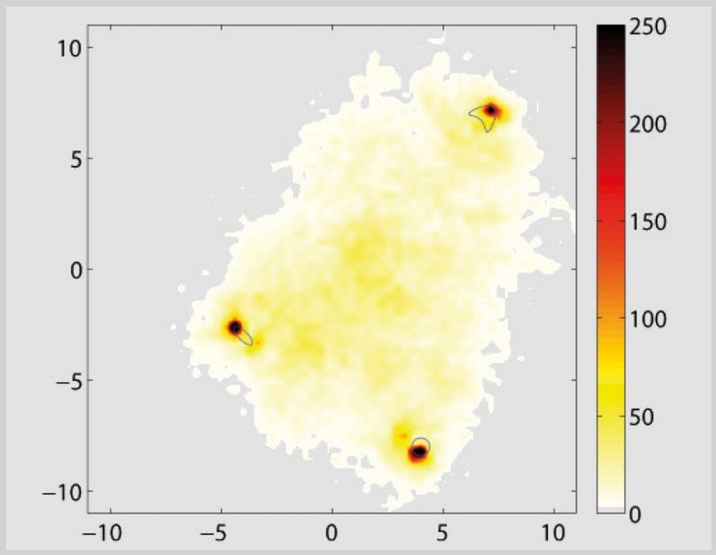


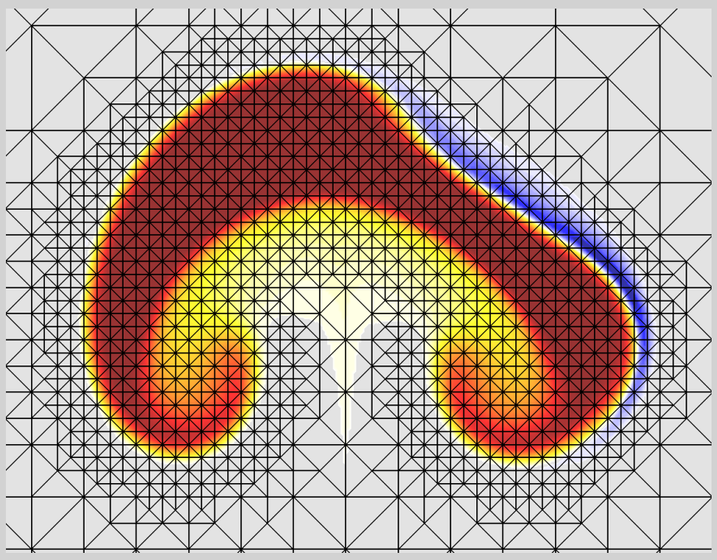

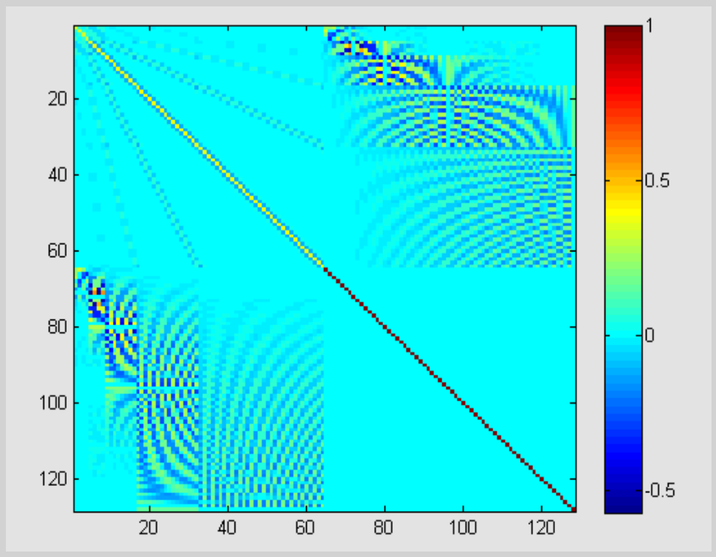


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# Oberseminar Numerik

**Frau Prof. Dr. Alina Chertock**
**(North Carolina State University)**

**22.11.19**
**10:15 Uhr**
**Hilbertraum 05-432**
**Staudingerweg 9, 55128 Mainz**

## *„Asymptotic Preserving Methods for Hyperbolic Conservation Laws“*

**Abstract**: Solutions of many hyperbolic systems reveal a multiscale character and thus their numerical resolution presence some major difficulties. Such problems are typically characterized by the occurrence of a small parameter. The solutions of these problems show a nonuniform behavior as the parameter tends to zero, for instance, the type of the limiting solution is different in nature from that of the solutions for a fixed values of that parameter. One of the canonical examples of such problems is low Mach number compressible or low Froude number shallow water equations.

In these limiting regimes, the propagation speeds are very low and therefore the use of standard explicit methods would require very restrictive time and space discretization steps. This becomes rapidly too costly from a practical point of view and consequently numerical solutions for small values of the parameter may be out of reach. Moreover, standard implicit schemes, while uniformly stable, may be inconsistent with the limit problem and thus may provide a wrong solution in the zero limit. Thus, designing robust numerical algorithms, whose accuracy and efficiency is independent of the value of the small  is an important and challenging task.

In the talk we describe asymptotic preserving schemes for the shallow water equations with Corriolis forces and compressible Euler equations (based on a new hyperbolic splitting and accurate and efficient elliptic numerical solver) and show an asymptotic analysis of the schemes, which is a very important step in ensuring that our method becomes an accurate and efficient solver in the limiting regimes. A number of numerical examples will also be provided to illustrate the performance of the proposed numerical approach.

**Hierzu sind alle herzlich eingeladen.**

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

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