



# Oberseminar Mathematische Strömungsmechanik

Institut für Mathematik der Julius-Maximilians-Universität Würzburg

**Hyperbolic equations - structure preserving methods & other topics**

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## Dynamical low-rank approximation for solving high-dimensional hyperbolic problems

*Abstract:*

High-dimensional hyperbolic problems arise in a number of applications. For example, the kinetic transport equations in plasma physics and radiative transport are up to six-dimensional hyperbolic partial differential equations. Another application area in which such problems arise is uncertainty quantification (UQ) of fluid dynamics.

The primary challenge in solving such problems numerically is the very unfavorable scaling of the number of degrees of freedom as a function of the dimensions. This is commonly referred to as the curse of dimensionality. In this talk, we introduce the dynamical low-rank approach to reduce the associated computational complexity. For hyperbolic problems, in particular, this approach has a number of advantages compared to more traditional techniques (such as sparse grids). For example, dynamical low-rank approximations can resolve the small-scale oscillations (called filamentation) inherent in such problems. We will present theoretical as well as numerical results that highlight the efficiency of this approach and discuss recent advances in obtaining conservative and asymptotic preserving low-rank approximations.

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

Friday, Dec. 10 at 3 pm CET

Zu diesem Vortrag sind Sie herzlich eingeladen.

*gez. Christian Klingenberg*