

## AUSHANG

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### Einladung zum IKET-Kolloquium

Zeit: Dienstag, 7. Februar 2017, 15.00 Uhr  
Ort: Kolloquiumsraum des IKET, Campus Nord, Bau 419, Raum 104  
Referent: Dr. Jianjun Xiao, KIT-CN, IKET  
Titel: Physical Modeling in All Speed Flows: Status and Challenges

#### Zusammenfassung:

Many flow problems of engineering interest extend from low speed hydrodynamics to high speed aerodynamics. Complicated physical phenomena like turbulence, heat transfer, chemical kinetics, flame instability and shock waves are involved. Traditionally, different numerical solvers are usually used for flows at various Mach numbers. Physical modeling of all-speed flows with one solution algorithm is highly desired by research scientists and engineers to capture all relevant flow phenomena. Great research efforts have been devoted to developing accurate solution algorithms suitable for modeling flows at a broad regime of Mach numbers. A robust and efficient high performance all-speed solver has been developed and validated. Validation cases of inviscid hydrodynamics ( $Ma \approx 0$ ), gas dynamics in shock tube ( $Ma \approx 1$ ), and supersonic flows ( $Ma \approx 3$ ), confirm the accuracy and validity of the solution algorithm. Three recent application cases involving flows at widely different Mach numbers will be presented:

- Large eddy simulation of a supersonic jet and turbulent dispersion;
- Reactive flow development through subsonic, transonic and supersonic regimes;
- Turbulent dispersion and gaseous explosion in a real scale industrial facility.

The challenges for physical modeling of flows at all speeds will be discussed. Ongoing research topics of the speaker will be briefly introduced as well.

gez. T. Schulenberg