MPIDS Colloquium



Discrete Unified Gas Kinetic Scheme for Multiscale Transport: Basics and Applications

Prof. Zhaoli Guo

School of Energy and Power Engineering Huazhong University of Science and Technology China



Multiscale transport phenomena appear in many fields, such as fluid flows associated with nano/micro-fluidics, re-entry vehicles and vacuum techniques, and heat transfer processes in nano-scale and composite materials. It is a challenging problem for modeling and simulating such processes due to the large spans of temporal and spatial scales as well as large range of physical scenarios. The Discrete Unified Gas Kinetic Scheme (DUGKS) is a recently developed numerical method for modeling multiscale transport process based on kinetic theory, which has the asymptotic persevering properties and is self-adaptive with the inclusion of transport physics from both continuum (diffusive) and freemolecular (ballistic) regimes in its algorithm development. In this talk we will report basic feature and recent progress of the DUGKS for some typical multiscale flows and heat transfer problems.

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Max Planck Institute for Dynamics and Self-Organization Laboratory for Fluid Physics, Pattern Formation and Biocomplexity Dr. Yong Wang Email: yong.wang@ds.mpg.de, Phone: +49-(0)551/5176-331

Am Faßberg 17, 37077 Göttingen, Germany