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25/09/13

EINLADUNG

zu einem Vortrag im Rahmen des
Kolloquiums Thermo- und Fluidodynamik

- Datum:** >> **Dienstag, 8. Oktober 2013** <<
- Zeit:** **11:15 Uhr**
- Ort:** Maschinenlaboratorium ETH Zürich
Hörsaal ML F 34
- Referent:** **Prof. Robert D. Moser**
Chair in Computational Engineering & Sciences
Department of Mechanical Engineering
The University of Texas at Austin, USA
- Thema:** **Computational Predictions of Complex Systems with Application to Atmospheric Re-entry Vehicles**

In computational science and engineering, the predictions we need to make are generally for quantities for which there are no data under the conditions of the prediction, since otherwise no predictions would be needed. Fundamentally, then, the predictions we are interested in are extrapolations from available information. At the Center for Predictive Engineering and Computational Sciences (PECOS), we are developing a conceptual context in which to assess such predictions. It involves four distinct processes: uncertainty modeling, model calibration, validation and predictive assessment. As we apply them, these processes rely on several ingredients, including: model inadequacy modeling, Bayesian inference, Bayesian model selection, sensitivity analysis and prior knowledge regarding the reliability and domain of applicability of the physics models involved.

In this talk, we will present results from predictions of the uncertain thermal protection system ablation rates in a typical capsule atmospheric entry scenario. These uncertainty propagation simulations were performed using a recently developed integrated multiphysics model with multi-way coupling between hypersonic thermochemical non-equilibrium flow, radiative heat transfer, and surface pyrolyzation and ablation. The process of validation that ultimately yields a prediction will be demonstrated by tracing the process for models of three of the sub physical phenomena active in this system: ablation, turbulence, and surface nitridation. These three different modeling/validation examples expose characteristics of typical validation exercises as well as problems that must be overcome in order to issue a successful prediction. Finally, the resulting impact of the models and their inadequacy on the full system simulation predictions will be discussed.

Host: Prof. P. Koumoutsakos

Gäste sind willkommen!