Univerzita Karlova
Matematicko-fyzikální fakulta

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Jarníkovskou přednášku

Advanced techniques for the numerical solution of singularly perturbed differential equations

kterou přednese

Prof. Dr. rer. nat. habil. Lutz Tobiska

(Otto-von-Guericke University,
Magdeburg, Germany)

ve středu dne 5. října 2016
ve 14.00 hod.

v posluchárně V. Jarníka (M1),
děkanát MFF UK, 2. patro
Ke Karlovu 3, Praha 2

Abstract: The lecture gives an introduction to the robust numerical solution of singularly perturbed differential equations which appear in different areas in applications. Prominent examples are convection-diffusion problems. If convection dominates diffusion boundary and interior layers appear, the standard finite element, finite volume and finite difference methods result in spurious oscillations unless the mesh size is small enough. We present ideas and properties of state of the art techniques to overcome these problems. A special focus is given to residual based stabilization techniques and to local projection type stabilizations which are useful to discretize the incompressible (Navier-) Stokes equations.

Lutz Tobiska was born in 1950 in Magdeburg. He finished his study of Mathematics at the TH Magdeburg in 1972 and obtained his PhD (Dr. rer. nat.) at TH Magdeburg in 1977. In 1984 he defended his habilitation treatise (Dr. rer. nat. habil.). Since 1990 he is full professor at the Otto von Guericke University Magdeburg. His scientific activities have been influenced by research visits at the Universities of Zürich (Switzerland), Cork (Ireland), Pittsburgh (USA), College Station (USA), Denver (USA), Peking (China) and Bangalore (India). L. Tobiska is mainly interested in discretization methods for the incompressible Navier-Stokes equations in time-dependent domains, two-phase flows with soluble surfactants and magnetic fluids with free boundaries. A special focus is devoted to fitted discretizations for convection-diffusion equations and superconvergence of finite element methods. From 1992 to 2002 he was the Speaker of the interdisciplinary Graduate School established by DFG. He successfully applied for grants in several DFG-Research Groups and in High Priority Research Projects. From 2004 to 2012 he was elected as a member of the DFG Review Board Mathematics. Currently he is a member of the Graduate School *Micro-macro interactions in structured media and particle systems* and has a project in the High Priority Research Program *Transport processes at fluidic interfaces*. Since 2004 he is a member of the Editorial Board of the Journal *Computational Methods in Applied Mathematics*. He published 3 monographs, 12 contributions in collective monographs and more than 120 scientific papers. His work was cited 1693 times by 1138 authors (MathSciNet).