# CME326: Numerical Methods for Initial Boundary Value Problems

## Aim

To provide advanced knowledge in analysis and methodology for initial boundary value problems (IBVP's). The focus is on the underlying principles and theoretical understanding of the techniques.

## Content

Fundamental properties for initial boundary value problems (IBVP's). The concepts of well-posedness for the IBVP. The crucial role of boundary conditions. Fundamental properties for numerical methods applied to the IBVP: concistency, convergence, stability, efficiency. Methods for analysis of finite difference schemes for IBVP's. Higher order approximations. Methods for complex geometries: multi-block methods, unstructured finite volume methods, discontinuous Galerkin Methods.

## Details

**Lecturer**: Jan Nordstrom, CTR, Building 500, room 501G, 488 Escondido Mall. http://user.it.uu.se/ nmj/

**Instruction**: Lectures and compulsory assignments.

**Examination**: There will be 5 mandatory problems to be done as home work. The mandatory problems have to be delivered according to the time schedule listed on the course homepage, no extensions will be allowed. No exam in class.

**Literature**: Bertil Gustafsson: High order difference methods for time-dependent PDE. ISBN 978-3-540-74992-9 e-ISBN 978-3-540-74993-6 DOI 10.1007/978-3-540-74993-6 Springer Series in Computational Mathematics ISSN 0179-3632 Library of Congress Control Number : 2007940500 Mathematics Subject Classification (2000): 65M06 

For more theoretical details, see also: Gustafsson, B., Kreiss, H.-O., and Oliger, J. (1995). Time dependent problems and difference methods. John Wiley and Sons.

**Time**: Lectures Monday-Wednesday 2.15-3.45 pm at McCullough 115. Office hours 2.00-3.00 pm Tuesdays.