

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 close relation between the IBVP and the suitable numerical method will be clarified. 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. Effects of uncertainty in data for the IBVP. Fundamental properties for numerical methods applied to the IBVP: consistency, 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, spectral difference methods.

Details

Lecturer: Jan Nordstrom, iCME and Linköping University, Huang Building, room M08. <http://www.mai.liu.se/~janno11/>

Instruction: Lectures and compulsory assignments.

Examination: There will be 6 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.

Course homepage: <http://www.stanford.edu/class/cme326/>

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 © 2008 Springer-Verlag Berlin Heidelberg

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

Time: Lectures Monday-Wednesday 1.45-3.15 pm at Y2E2 105. Office hours 2.00-3.00 pm Tuesdays.