PhD course: High order difference methods for time dependent PDE, 3p

Difference methods on structured grids have the advantage of being fast and easy to implement. However, most methods used in practice are of second order accuracy or less, and this is usually not optimal. In particular it has been shown that higher order methods are more efficient for most wave propagation problems. In this course we will discuss the construction and analysis of higher order methods for time dependent PDE. Part of the content is based on developments during the last few decades, but we will also bring up some recent results, for example concerning the application to problems with discontinuous coefficients.

It is assumed that the students have basic knowledge of difference methods for PDE. There is a little, but not much, overlap with other advanced courses given at TDB, and PhD students get full credit (3p) regardless of earlier background. Anybody who is interested in the course without credit, is also welcome to attend. There will be 8-10 double lectures.

Content (preliminary):

Why higher order methods?
Approximation in space
Approximation in time
Boundary treatment
Internal irregular boundaries
Examples of applications
(8 or a few more double lectures)

Literature:

All material will be provided during the course. Some of that is recent unpublished material, and some of it will be taken from selected articles.

Examination: Three mandatory problems during the course.

Time: Tuesdays 10-12 beginning Sept 20

Place: MIC, Polacksbacken. Room to be announced.

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