Karlsruher Institut für Technologie
Fakultät für Mathematik
Institut für Angewandte und Numerische Mathematik
Prof. Dr. Tobias Jahnke

Seminar in Winter semester 2021/22

Special time integrators

Tobias Jahnke, Benny Stein

When, where, who?

Time:	Monday, 10:00-11:30h (to be confirmed)
Room:	Seminar room 3.069, math building 20.30 (to be confirmed)
Participants:	Students in the Master program in Mathematics as well as students in the German Bachelor or Master programs Mathematik, Technomathematik, Wirtschaftsmathematik
Prerequisite:	Module *Numerical methods for differential equations*

Topic

Time-dependent partial differential equations are often encountered when processes in physics, chemistry, biology, engineering, and many other fields are modeled. Since exact solutions are only known in exceptional cases, the solution usually has to be approximated by numerical methods. Most often the partial differential equation is first transformed into a system of ordinary differential equations by a suitable space discretization. The solution of this system is then approximated by another numerical method in a second step. This second step is called time integration or time discretization.

In addition to the classical Runge-Kutta and multistep methods, there are many time integrators that are specifically tailored to the structure of the differential equation. We will get to know some examples in the course of this seminar, with a special focus on differential equations with oscillatory or non-smooth solutions as well as on the dynamical low rank approximation of matrix-valued differential equations.

The seminar is intended for students in the Bachelor and Master program who have completed the module *Numerical methods for differential equations* (*Numerische Methoden für Differentialgleichungen*) or a comparable course. A deeper knowledge of analysis and numerics of partial differential equations is not required, but would be helpful. Talks can be given in German or English. The seminar offers a good preparation for a bachelor or master thesis.

First meeting and registration

The first meeting, topic assignment and registration will take place on Friday, 23.07.2021, at 1:00 p.m. via Zoom meeting:

https://kit-lecture.zoom.us/j/68637077989?pwd=Nm5XdzJUWjQ0Zk8xa21jVHdubHZrQT09
Meeting ID: 686 3707 7989, Passcode: 179299

A list of possible topics and references will be posted one week before the first meeting on the website

https://www.math.kit.edu/ianm3/∼jahnke/en

Contact

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