

Einladung zum Vortrag im Oberseminar Analysis

Mathematical modeling and numerical analysis should work together

Prof. Dr. Hendrik Ranocha
(Uni Mainz)

A few months ago, Cordula Reisch has visited me in Hamburg. We wanted to work together to use some recently developed structure-preserving numerical methods for problems coming from mathematical biology. To start our collaboration, we wanted to find a simple model that satisfies the structural assumptions of so-called modified Patankar-Runge-Kutta methods — a class of time integration schemes designed to preserve the positivity of numerical solutions. Thus, we chose a model describing the inheritance of genes. First numerical experiments looked promising, but we observed severe instabilities in long-time simulations. This behavior can be explained by a mathematical analysis of the model, based on the classical theory of dynamical systems.

We summarized our findings in the article <https://arxiv.org/abs/2304.02365>. The target audience of this article are undergraduate students with basic knowledge in dynamical systems and numerical methods for ordinary differential equations. In this talk, I will summarize our work and explain why a close collaboration of mathematical modeling, analysis, and numerics is important for me.

Alle Interessierten sind herzlich eingeladen!

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