ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

Structure preserving numerical and statistical methods for stochastic differential equations

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Chaired by Michaela Hitz | Department of Statistics

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ABSTRACT

The interest in modelling dynamical real-world phenomena with stochastic differential equations (SDEs) has increased steadily in the last decades. For realistic problems, explicit solutions are rarely available, and numerical approximations are required. The idea behind structure preservation is to guarantee that the constructed numerical solution has the same or similar properties as the true (unknown) solution of the equation under consideration. In this talk, we address the importance of structure preservation when numerical methods are used within statistical inference tools for SDEs. For example, numerical methods are used to generate synthetic data in simulation-based inference algorithms, or to approximate the transition density of the process within likelihood-based inference tools. Frequently applied (tamed/truncated) Euler-Maruyama approximations may not preserve important structural properties. This may lead to ill-posedness of the estimation tool or make reliable inference impossible. We discuss these issues in the context of SDEs with non-globally Lipschitz continuous drift and/or

degenerate diffusion coefficients that are applied in neuroscience. In particular, we construct structure preserving numerical splitting methods and use them to perform parameter estimation via approximate Bayesian computation.

We hope to see you there!

