

Seminar for Doctorands

Convergence of OS-POD System

Markus Müller

“Proper orthogonal decomposition” (POD) is a powerful Galerkin type technique for model reduction of evolution systems. A “POD basis” presents an, in some sense, optimal representation of “snapshots” of the dynamical system. However, in the context of optimal control, a problem of “unmodeled dynamics” may arise: The POD basis elements are computed from a reference trajectory which may contain features which are quite different from those of the optimally controlled trajectory. In Optimality Systems POD (OS-POD), that problem is avoided by augmenting the optimality system of the control problem with the POD basis generation criteria.

In this talk, we present a proof for the convergence of the optimal “OS-POD control” to the full-order optimal control as the dimension of the POD low-order system goes to infinity. Finally, basic numerical examples shall illustrate the algorithm. For the proof, the dynamical system is assumed to be of linear parabolic type and a continuous snapshot set is used. A major ingredient of the proof is the previous work on the convergence of POD in reduced-order modeling for fixed data. Further, crucial steps are a new result on the uniformity of the convergence w.r.t. the right hand side of the system as well as carefully considering the regularity of the problem.

Parameter Estimation of Multiplicative Binomially Distributed Random Variables for an Application in the Paper Industry

Verena Feirer

This work considers data from an industrial printing trial and focuses on the modelling of unprinted areas by the employment of local paper properties. The initially applied model, a generalized linear model, can only account for binary data with binomial variance whereas the variability of the actual data differs considerably from that. Which is why another distribution, the multiplicative generalized binomial distribution, is considered as a better means to describe the underlying data from the paper and print industry. First parameter estimations for that distribution are currently under way and will conclude the overview over the work.

Space-Time Methods with Applications

Martin Neumüller

For evolution equations we present a space-time method based on Discontinuous Galerkin finite elements. This method will be applied to the heat equation and to the Navier Stokes equations. Numerical examples and some applications will be given.

Time: Friday 10 December, 13:00 s.t.

Place: Seminar room A 206, Steyrergasse 30/II, TU Graz