Model Reduction for Optimal Control Problems

Martin Gubisch
(Universität Konstanz)

Solving an optimal control problem governed by a partitial differential equation numerically usually requires to solve pdes of similar form several times. If standard methods such as finite differences or finite elements are used, an accurate discretization results in large linear systems. To decrease the number of unknowns, different model reduction techniques can be applied.
The idea of Proper Orthogonal Decomposition (POD) is to construct a small, problem-specific Galerkin basis. Unfortunatelly, the initially given information often is not sufficient to find such a basis immediatelly; instead, the dynamics of the optimal pde solution are required. Hence, efficient updating techniques are required to achieve good approximations.
The talk will give an introduction into POD model reduction and demonstrate its procedure at the example of state-constraint optimal control of a heat flux.