

# Reduced Order Modeling for Experimental Design and Parameter Estimation Problems

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**Abstract:** When dealing with Partial Differential Equations in the context of Experimental Design and Parameter Estimation problems we will typically face a dramatic increase in the number of discretization variables compared to models with ODE constraints. By applying Proper Orthogonal Decomposition (POD) we can obtain a smaller reduced order model which allows to take advantage of existing efficient optimization algorithms for the ODE case.

We want to have a closer look at a model for heterogeneous catalysis including time dependent advection-diffusion-reaction equations and discuss the applicability of POD to this model. We can observe that the reduced order model gives good approximations for the forward simulation but the approximations of the derivatives might be insufficient. One remedy is the inclusion of derivative information into the computation process of the Proper Orthogonal Decomposition. We want to discuss this approach and compare convergence properties of the original and the reduced order model.

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