

Model Order Reduction in Electric Machine Simulation

Model Order Reduction is an essential tool for speeding up simulations of electric machines while guaranteeing the required level of accuracy. There are different approaches, ranging from equivalent circuit strategies to singular value decomposition and surrogate models in the context of machine learning. In this talk, we present the Reduced Basis Method and demonstrate how it can be efficiently split into a costly offline phase and a very fast online phase for a linear heat transfer problem in a squirrel cage induction machine. For nonlinear problems, it is more difficult to evaluate the nonlinearity in a way that also results in a fast online phase. In this context, we present the Empirical Interpolation Method which deals with the nonlinearity by approximating it as a linear combination of parameter-independent basis functions evaluated at selected interpolation points. Finally, we will provide an overview of other approaches that could be used for nonlinear model order reduction.