Multiobjective Optimal Control using Reduced-Order Modeling

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Many optimization problems in applications can be formulated using several objective functions, which are conflicting with each other. This leads to the notion of multiobjective or multicriterial optimization problems.
This talk discusses the application of the reference point method in combination with model-order reduction to multiobjective optimal control problems of elliptic and parabolic PDEs with up to four cost functions. Since the reference point method transforms the multiobjective optimal control problem into a series of scalar optimization problems, model-order reduction is used to lower the computational cost. Due to the lack of a-priori analysis for the model-order reduction, a-posteriori estimates are important to be able to ensure a good approximation quality. To this end, an a-posteriori estimate for the problem at hand is introduced and used for developing new strategies for efficiently updating the reduced-order model in the optimization process.