On A-posteriori Error Estimates for Proper Orthogonal Decomposition

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Abstract: The method of proper orthogonal decomposition (POD) is widely used for model reduction of distributed parameter systems. Compared with other reduction methods such as balanced truncation, it is applicable to nonlinear and time variant systems, but it is lacking reliable a priori error estimates. In the talk, an a-posteriori analysis for the POD method is suggested and applied to optimal control problems governed by parabolic and elliptic PDEs. Based on a perturbation method it is deduced how far the suboptimal control, computed on the basis of the POD model, is from the unknown exact one. The perturbation method itself is a common tool in the error analysis for optimal control problems. Numerical examples illustrate the efficiency of the proposed approach for linear-quadratic problems governed by parabolic and elliptic partial differential equations.

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