REDUCED ORDER MODELING WITH ERROR CONTROL AND ADAPTIVITY

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ABSTRACT

Reduced order modeling represents a well-established technique for the efficient yet reliable simulation of computationally demanding problems. Complex computation domains, material nonlinearities and manifold coupling phenomena of underlying physical processes make it necessary to handle large data sets and to solve high-dimensional equation systems. Reduced order modeling limits these drawbacks and reduces the problems' complexity vastly. However, the successful application of reduced order models should ideally include the estimation the confidence range of the particular method and, therewith, the error of the predicted outputs.

The mini-symposium addresses computational aspects related to error estimation and adaptivity for reduced order models. The question of how error (local/ global) can be quantified and possibly controlled during the simulation are of particular interest. Topics include:

- Sources of error:
    - Function space/reduced basis discretization errors
    - Discretization errors in space and time (prior to reduction)
    - Constitutive (modeling) errors

- Adaptive error control:
    - Selection and enrichment of the (reduced) function space
    - Refinement of underlying (space and time) discretization
    - Selection and enrichment of hierarchical models

Applications include but are not limited to optimal control, multi-field problems, multi-scale simulations (e.g. FE^2/computational homogenization, e.g. [1]) and inverse problems.

REFERENCES

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