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GOAL-ORIENTED ERROR ESTIMATION AND ADAPTIVITY

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ABSTRACT

Error estimation and adaptation are essentiel for efficient and reliable computer simulations of complex phenomena. Indeed, the numerical solution of many practical problems in computational sciences and engineering is challenging, and designing adaptive methods is of paramount importance for reducing computational costs while retaining a suitable level of accuracy. The topic now extends beyond classical discretization error assessment and mesh refinement as in standard *hp* adaptive finite element methods as it also encompasses adaptive reduced-order modeling for building accurate surrogate models of random/parametric partial differential equations, models which are particularly useful in the context of multi-query simulations for uncertainty quantification, optimization, or inverse design. It further includes novel topics relevant to engineering applications, including goal-oriented methods for the control of errors in specific quantities of interest.

The objective of the mini-symposium is to present the latest developments on goal-oriented error estimation and adaptive methods. We anticipate talks on topics including:

• Discretization and modeling error analysis for nonlinear or time-dependent problems;
• Control of errors in multi-physics or multi-scale problems;
• r-adaptive methods based on moving mesh or optimal transport techniques;
• Adaptive strategies for reduced-order models;
• Error estimation and adaptive schemes for uncertainty quantification;
• Stability, convergence, and optimality analysis of adaptive methods;
• Error estimation for scientific machine learning;
• Use of machine learning techniques for error estimation and adaptivity.