Goal-oriented modeling in Computational Mechanics

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In scientific and engineering activities, the goal of numerical simulations is usually not the global solution itself, but simply some local features (quantities of interest) that are needed for analysis or decision-making. It is thus relevant and appealing to set up a goal-oriented modeling and simulation approach, dedicated to the accurate prediction of quantities of interest alone and associated with lighter computational procedures compared to a classical approach where the global solution is of interest.

During the talk, we will introduce and illustrate this goal-oriented approach on three Computational Mechanics applications:
(i) goal-oriented error control and adaptivity in FEM simulations;
(ii) goal-oriented model reduction for complex multi-parameter models;
(iii) goal-oriented model updating from experimental data.

These topics will be addressed within a common framework built from adjoint-based methods.