Adjoint-based error control and sensitivity analysis for shallow water models

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Abstract

We present an *a posteriori* error control framework, based on the solution of appropriate adjoint problems, valid for single and multiple-stack shallow water models. We focus on finite elements discretizations using various combinations of non-conforming and mixed elements for forward and adjoint solves. We extend the framework to handle adjoint-based sensitivity analysis, including the effect of numerical error in the sensitivity calculation. Finally, we discuss modifications to the error control framework to handle standard types of operator decomposition: *e.g.* iteration on multiple stacks in a stacked model, and/or multirate time integration.

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