

Reduced order modelling for data assimilation in parametrized optimal control framework

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Modelling data assimilation allows to fill the gap between numerical simulations and experimental data. Optimal control problems governed by parametrized partial differential equations is suited for this kind of application, where you want to track problem solutions towards known quantities, given by data collections or previous knowledge. Still, the computational effort increases when one has to deal with nonlinear and/or time-dependent governing equations.

Reduced order methods are an effective approach to solve data assimilation problems in a reliable and faster way. We apply the POD-Galerkin methodology in environmental marine sciences where different parameters describe several physical configurations.

We present two numerical experiments: a boundary control for riverbed current represented by time-dependent Stokes equations, and a nonlinear time-dependent tracking problem for velocity-height solutions of shallow water equations.

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