ID de Contribution: **72** Type: **Non spécifié**

Coupling shallow-water models at different scales using parallel-in-time methods

vendredi 28 mai 2021 11:20 (30 minutes)

In this work, we formulate a numerical model coupling the two-dimensional nonlinear shallow water equations at different scales, in order to obtain accurate solutions with reduced computational cost. This coupling is performed using predictor-corrector iterative parallel-in-time methods. In this type of method, predictions are obtained by the sequential simulation of a low-expensive, coarse model, whereas corrections are provided by expensive, fine simulations computed in parallel across the temporal domain. More precisely, we focus on the parareal method, one of the most popular parallel-in-time algorithms. As a major challenge, temporal parallelization usually suffers from instabilities and slow convergence when applied to hyperbolic problems. We thus consider a variant of the method that uses reduced-order models formulated on-the-fly along the parareal iterations, being able to partially reduce these issues. Limitations of the method are identified and additional modifications are proposed for further improvements. The proposed methods are compared in terms of stability and convergence towards the reference solution, provided by an expensive, fine simulation, and their performances in accelerating the numerical simulations are assessed via a parallel implementation.

Auteurs principaux: CALDAS STEINSTRAESSER, Joao Guilherme (Inria LEMON; IMAG-UM); M. ROUSSEAU, Antoine (Inria LEMON; IMAG-UM); Prof. GUINOT, Vincent (HydroSciences Montpellier - UM; Inria LEMON)

Orateur: CALDAS STEINSTRAESSER, Joao Guilherme (Inria LEMON; IMAG-UM)

Classification de Session: Exposés

Classification de thématique: Présentation orale