

On In-Situ Visualisation for Strongly Coupled Partitioned Fluid-Structure Interaction

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ABSTRACT

We present an integrated and in-situ visualization approach for partitioned multi-physics simulation of coupled fluid-structure interaction. Instead of directly accessing the data of the structure solver, we communicate these data from the structure solver to the fluid solver by means of the software layer that provides the two-way coupling between the simulation codes, and visualize it there.

In this context, we present new visualization technique for the analysis of the interrelation of the two solvers in terms of the coupling interface, with emphasis on the involved error due to discretization in space and time and the associated reconstruction. Our visualization approach also enables the investigation of these errors with respect to their mutual influence on the two simulation codes and their space-time discretization.

For efficient interactive visualization, we employ the concept of explorable spatiotemporal images, which also enables finite-time temporal navigation in the in-situ environment. We demonstrate our overall concept by means of a fluid-structure simulation using OpenFOAM fluid and structure solver coupled with the preCICE software layer.