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Model order reduction of embedded boundary models MACIEJ BALAJEWICZ, CHARBEL FARHAT, Stanford University — Embedded boundary methods for Computational Fluid Dynamics (CFD) and fluid-structure interaction problems are gaining popularity because they alleviate computational challenges associated with meshing and large wall boundary motions, deformations, and even topological changes. Developing model order reduction methods for computational frameworks based on the embedded boundary method seems however to be challenging. Indeed, most popular model reduction techniques are projection-based and rely on the computation of fluid basis functions based on simulation snapshots. In a traditional body-fitted computational framework, this computation is straightforward because the fluid always occupies the same computational domain. In the embedded computational framework however, deriving global fluid basis functions is problematic a priori because the Eulerian fluid mesh is traversed by the Lagrangian structural mesh. Hence, snapshots collected at different time-instances lose in this case a sense of coherency or consistency. Nevertheless, we demonstrate that this loss of coherency is not a show-stopper for projection-based model reduction based on snapshots.

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