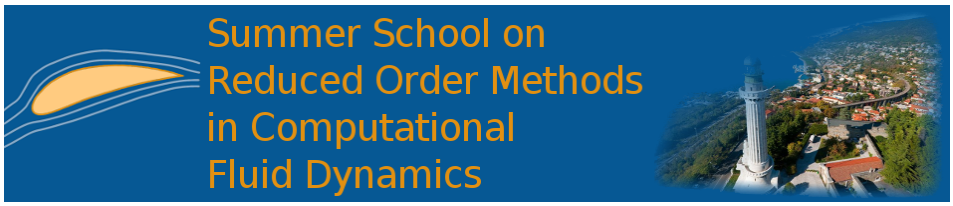

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A reduced order model for segregated FSI solvers based on a ALE approach

Interactions between fluid and moving (deforming) structures are essential in many fields such as aerospace, civil, and mechanical engineering. Numerical simulation has been one of the few available methods for studying this problem. The flow past a circular cylinder is a benchmark problem in fluid dynamics that serves to illustrate a large variety of applications. Therefore, flow around a fixed or moving cylinder has received continued attention in recent decades. In addition to being a building block in understanding bluff body dynamics, it has many applications in engineering situations. This complicated fluid-structure interaction phenomenon still draws the attention of researchers and has become the typical test case for new numerical techniques. This presentation shows results for a reduced-order model built upon a segregated algorithm based on a PIMPLE strategy with dynamic mesh capability. We generate modes using the proper orthogonal decomposition (POD) technique. The full order model (FOM) is the flow around a cylinder that is free to vibrate in the vertical direction. We verify our results by comparing the velocities and pressure obtained by the full-order and reduced-order models. In addition, we compare the frequencies (in the lock-in region) of the vortex shedding in both cases and the displacement of the center of the cylinder. The reduced-order model's solution results were obtained with ITHACA-FV (In real Time Highly Advanced Computational Applications for Finite Volumes), a C++ OpenFOAM-based library.strong text

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