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**Fluid-structure interaction simulations of deformable structures with non-linear thin shell elements**[1] HAFEZ ASGHARZADEH, MOHAMMADALI HEDAYAT, IMAN BORAZJANI, State Univ of NY - Buffalo, SCIENTIFIC COMPUTING AND BIOFLUIDS LABORATORY TEAM — Large deformation of structures in a fluid is simulated using a strongly coupled partitioned fluid-structure interaction (FSI) approach which is stabilized with under-relaxation and the Aitken acceleration technique. The fluid is simulated using a recently developed implicit Newton-Krylov method with a novel analytical Jacobian. Structures are simulated using a triangular thin-shell finite element formulation, which considers only translational degrees of freedom. The thin-shell method is developed on the top of a previously implemented membrane finite element formulation. A sharp interface immersed boundary method is used to handle structures in the fluid domain. The developed FSI framework is validated against two three-dimensional experiments: (1) a flexible aquatic vegetation in the fluid and (2) a heaving flexible panel in fluid. Furthermore, the developed FSI framework is used to simulate tissue heart valves, which involve large deformations and non-linear material properties.

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