

A Nitsche-based contact formulation for fluid-structure interactions with contact

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In this presentation we develop a Nitsche-based contact formulation for fluid-structure interaction (FSI) problems with friction-free contact. Our approach is based on the works of Chouly and co-workers for contact problems in solid mechanics [1, 2]. The introduction of an artificial fluid allows us to formulate the FSI interface and the contact conditions simultaneously in equation form on a joint interface-contact surface $\Gamma(t)$. This equation can then be included fully implicitly within a monolithic variational formulation by using Nitsche's method.

To deal with the topology changes in the fluid domain at the time of impact, we use a monolithic Fully Eulerian approach for the FSI problem [3, 4]. For discretisation, both fitted and unfitted finite elements are considered. We compare the effect of slip- and no-slip interface conditions and show numerical results that illustrate the performance of the method.

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