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The immersed interface method without interface parametrization GLEN PEARSON, SHENG XU, Southern Methodist University — To simulate fluid-solid interaction or two-fluid flows on Cartesian grids by the immersed interface method, we incorporate into a numerical scheme the jump conditions of the first- and second-order Cartesian derivatives of the velocity and pressure. These Cartesian jump conditions can be systematically derived from the principal jump conditions for the velocity and the pressure [Sheng Xu, Z. Jane Wang, Systematic derivation of jump conditions for the immersed interface method in three dimensional flow simulation, SIAM J. Sci. Comput. Vol 27, No. 6, pp. 1948-1980.], i.e. the jump conditions of the velocity and the pressure, their normal derivatives and their Laplacians. However, this previous derivation requires the global parametrization of a fluid-solid or two-fluid interface. In this talk, we present a new derivation which is based on the triangulation of an interface and avoids the interface parametrization. The new derivation makes the immersed interface method more robust for applications. We will test our new derivation by solving Poisson equations with discontinuous solutions across triangulated interfaces.

Glen Pearson
Southern Methodist University

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