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Xu Zhang* (xuzhang@purdue.edu). *Nonconforming Immersed Finite Element Methods for Interface Problems.*

Immersed finite element (IFE) methods are a class of finite element methods for solving interface problems whose solution mesh is not required to align with interface. Classic IFE functions are constructed from conforming Lagrange finite elements. Conforming IFE methods are usually less accurate around the interface than the rest of simulation domain due to the discontinuity of approximation functions across element boundaries. Recently, we develop a class of new IFE functions based on nonconforming finite element functions on rectangular meshes. A different approach to impose the continuity greatly reduce the impact of the discontinuity across the elementary boundary; hence, the accuracy around interface is improved significantly. We will show some new and fundamental inequalities that lead to the optimal error estimates. Numerical Experiments will be presented to demonstrate features of new IFE methods. (Received August 29, 2015)