

1171-65-78

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Immersed Finite Element Methods for Three-Dimensional Interface Problems.

In this talk, I will some recent advances in algorithm development and error analysis of Immersed Finite Element (IFE) methods for solving three-dimensional interface problems. The method can be utilized on interface-unfitted tetrahedral and cuboidal meshes even if the 3D interface surface possesses an arbitrary shape. Fundamental estimates such as trace inequalities, inversed inequalities, and approximation capabilities will be established. Optimal a priori error estimates are proved in both energy and L2 norms. Numerical examples will be provided not only to verify our theoretical results but also to demonstrate the applicability of this method in tackling some real-world 3D interface models. This is joint work with Ruchi Guo. (Received August 08, 2021)