

ACMS Applied Math Seminar



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Washington University, St. Louis
Thursday, March 3, 2022
154 Hurley Hall
3:30 PM – 4:30 PM

The Curious Case of Virtual Element Methods: Shape Robustness

The virtual element methods (VEM) is a new method that can be used on arbitrarily-shaped polytopal partition to approximation PDEs. In the pioneering meta-theoretical framework of VEM by F. Brezzi and his collaborators, a key norm equivalence relation is needed to bridge the discrete stability and its continuous counterpart to guarantee the convergence. This practice requires stringent geometric assumption about the mesh, yet in practice, VEM shows great robustness with respect to the potential anisotropy in the mesh. In this study, we shall investigate this curious case from perspectives from nonconforming methods, such as discontinuous Galerkin, immersed finite elements, and ghost fluid/penalty. We also re-examine commonly used tools in simplicial finite element methods to adapt them to polytopal finite element to study the reason why virtual element has such robustness.

This is a joint work with Dr. Long Chen (UC Irvine), Dr. Ruchi Guo (UC Irvine), and Dr. Frank Lin (formerly at UC Irvine).

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