# An Adaptive Stabilized Finite Element Method Based on Residual Minimization

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Computational methods are fundamental in the development and design processes in modern-day engineering. Multiscale and multiphysics processes are challenging for state-of-the-art computational methods. For example, the simulation of extremely complex flows requires a significant amount of computational resources as well as sophisticated models and numerical methods to deliver reliable results. Over the last decades, considerable efforts attempted to develop computational techniques that overcome difficulties encountered by classical discrete approximations (e.g., finite differences, finite volumes, and finite elements) when dealing with coupled flow problems. In this talk, we will describe a new class of adaptive stabilized finite element (FE) methods based on residual minimization. The discretization results from a non-conforming Discontinuous Petrov-Galerkin (DPG) method where the test space is discontinuous and the trial space is a subspace of the test space. This restriction to a subspace grants several desirable properties to the discrete solution. For example, we can use a continuous trial space that delivers a discretely stable solution and a robust error estimator for performing on-the-fly adaptivity. We will use several model problems in 2D and 3D to validate our theoretical results.