A stabilized finite element formulation for numerical simulation of convection-dominated reactive models

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ABSTRACT

In this talk, we are interested in the numerical solution of convection-dominated models with nonlinear reaction mechanisms. The existence of the advection term(s) in the relevant models causes the numerical solutions obtained by standard methods to exhibit nonphysical oscillations. Therefore, the Galerkin finite element method (GFEM) is stabilized using the Streamline-Upwind/Petrov-Galerkin (SUPG) technique to prevent spurious oscillations. Moreover, the stabilized formulation is enhanced by the YZβ shock-capturing technique. Finally, the proposed numerical scheme is tested on various reaction models. All the numerical computations are performed in the FEniCS environment.

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