ACMS Applied Math Seminar

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Thursday, April 20, 2023
154 Hurley Hall
3:30 PM – 4:30 PM

Numerical Simulation of Three-phase Flow in Porous Media

Modeling the flow of liquid, aqueous, and vapor phases through porous media is a complex and challenging task that requires solving nonlinear coupled partial differential equations. In this talk, we propose a second-order accurate and energy-stable time discretization method for the three-phase flow problem in porous media. We prove the convergence of the linearization scheme and demonstrate the energy-stability property. Our spatial discretization uses an interior penalty discontinuous Galerkin method, and we establish the well-posedness of the discrete problem and provide error estimates under certain conditions on the data. We validate our method through numerical simulations, which show that our approach achieves the theoretical convergence rates. Furthermore, the numerical examples highlight the advantages of our time discretization over other second-order approximations.