Mathematical Sciences

Fall 2021

Colloquium Series

Dr. Natasha Sharma

The University of Texas at El Paso

⋮ **Online (Zoom) Meeting** ⋮

⋮ **Friday, October 1** ⋮ **3pm** ⋮

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Numerical schemes for sixth-order phase field models with applications to microstructure evolution and microemulsions

Abstract

Sixth-Order Phase Field models serve as an effective tool in capturing the dynamics of growth of a polycrystal in a supercooled liquid and, in capturing static properties of ternary oil-water-surfactant systems. Examples of promising applications include oil recovery, drug delivery systems and crack propagation in a ductile material. Despite its applications, a major challenge impeding the use of these equations has been and continues to be, a lack of understanding of these complex systems. In this talk, we present numerical algorithms for approximating the solutions to sixth-order phase field equations. Here, the spatial discretization relies on a continuous interior penalty Galerkin method while for the temporal discretization, we propose first-order accurate time-stepping schemes. Theoretical properties of convergence, unique solvability and stability of the proposed schemes will be mathematically proven and through extensive numerical experiments, we will demonstrate the performance of the proposed schemes.

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