

College of Arts and Sciences

Interdisciplinary Mathematics Institute

University of South Carolina

IMI Seminar Series



The Phase Transition and Large Deformation Theory of Macromolecular Microsphere Composite Hydrogel

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In this talk, I will present the phase transition process and large deformation theory of Macromolecular Microsphere Composite (MMC) Hydrogel.

Firstly, we use the Time-Dependent Ginzburg-Landau (TDGL) mesoscopic model to simulate the phase transition process of macromolecule microsphere composite (MMC) hydrogel. We propose a free energy for such a reticular structure according to the structures of MMC hydrogel and entropy theory. This work generalizes the mean field theory confined by Flory-Huggins for free energy in a polymer blend system. A spectral method is adopted to numerically solve the MMC-TDGL equation. The numerical results are consistent with chemical experiments, showing the network structure. According to the numerical results at different temperatures, we understand that the system shows intermittent phenomenon with increasing reaction temperature, which is a very good explanation of chemical experiments.

Then we investigate the large deformation theory for the macromolecular microsphere composite hydrogel. It is presented in the large deformation model. Simulation results are completely consistent with the chemical experiment for the strain-stress relation. So this theory can be extended to other soft matters.

TUESDAY

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26

2:40 - 3:40 PM

LeConte College

Room 312



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