Civil Engineering Graduate Seminar

SPEAKER

Dr. Yongmei M. Jin

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Dr. Jin received B.E. and M.E. in Mechanical Engineering from University of Science and Technology of China in 1994 and 1997, respectively, and Ph.D. in Materials Science and Engineering from Rutgers University in 2003. After two years of postdoctoral research at Rutgers University, she joined the Department of Aerospace Engineering at Texas A&M University in 2005 as an Assistant Professor and transferred to the Department of Materials Science and Engineering at Michigan Tech in 2009. Her research interest focuses on materials modeling and computer simulation. In particular, she has been working on the development and application of phase field models to investigate microstructure evolutions in crystalline materials during various physical processes, e.g., martensitic transformation, decomposition, ordering, ferromagnetic domain switching, magnetomechanical behaviors, and defect evolutions (dislocations, cracks, voids, and free surfaces) in single- and poly-crystalline bulk and thin film materials and nanoparticles.

Domain Microstructure Evolution and Magnetomechanical Property of Giant Magnetostrictive Materials

Domain microstructure evolution and magnetomechanical property of giant magnetostrictive materials are investigated by phase field micromagnetic microelastic modeling. The model explicitly treats magnetic and elastic domain microstructures, accurately calculates various thermodynamic driving forces (magnetostatic, elastostatic, magnetocrystalline, exchange, chemical, interfacial, applied magnetic field, mechanical loading), simultaneously takes into account multiple physical mechanisms, and automatically describes the domain microstructure evolutions along kinetically favorable pathways without a priori constraint. In particular, coupled magnetic and elastic domain microstructure evolutions in magnetic shape memory alloys are simulated. The simulation results reveal the effects of external magnetic field, twin boundary mobility, and twinning strain on domain structure evolutions, which help explain peculiar magnetic field-induced strain behaviors observed in magnetic shape memory alloys. Application of phase-field modeling to the microstructure evolutions in other material processes are also discussed. Connections between mesoscale phase-field modeling, atomistic (first principles, molecular dynamics) and continuum (finite element) simulations, thermodynamic and kinetic databases as well as experiments are addressed.

4-5 pm, March 29th
Dow 624, public welcome

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