



Using HPC to Model Microstructure formation in Metal Alloys (*Opening Keynote*)

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We will examine how high performance computing and new algorithms can be applied to continuum field models to make the simulation of microstructure formation feasible. Understanding microstructure pattern formation is vitally important in the manufacture of new metallic alloys. Microstructural phenomena have been traditionally very difficult to simulate because of the multi-scale nature of the problem, with features ranging from phase boundaries at about a nanometer to alloy microstructures at and hundreds of micrometers. In this talk we will examine the features of a recent OpenMP adaptive-mesh regiment algorithm designed to work with phase-field models of solidification. New solidification results will be presented and the advantages and problems encountered with using such multi-scale techniques will be discussed.