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**Arvind Baskaran\*** (baskaran@math.uci.edu), **Zhen Guan** (zguan2@math.uci.edu) and **John Lowengrub** (lowengrub@math.uci.edu). *Energy Stable Finite Difference Methods for Hydrodynamic Models of Freezing.*

This talk will outline the development of unconditionally energy stable finite difference methods for hydrodynamic models of freezing of liquids. The class of models considered take the form of compressible isothermal Navier Stokes equations with source terms. The source terms are in turn defined as gradients of chemical potentials. The variational formulation underlying the models will be discussed. The general frame work of development of unconditionally energy stable convex splitting methods for these models will be outlined. The development and implementation of the method will be detailed for the case of the hydrodynamic phase field crystal model. Some numerical examples and application of the model to study the effect of flow on freezing of liquids will also be discussed. (Received February 10, 2014)