1125-65-1161 **Shuonan Wu*** (sxw58@psu.edu) and **Jinchao Xu**. *Multiphase Allen-Cahn and Cahn-Hilliard models and their discretizations with the effect of pairwise surface tensions.*

In this talk, the mathematical properties and numerical discretizations of multiphase models that simulate the phase separation of an N-component mixture are studied. For the general choice of phase variables, the unisolvent property of the coefficient matrix involved in the N-phase models based on the pairwise surface tensions is established. Moreover, the symmetric positive-definite property of the coefficient matrix on an (N−1)-dimensional hyperplane can be proved equivalent to the some physical condition for pairwise surface tensions. The N-phase Allen-Cahn and N-phase Cahn-Hilliard equations can then be derived from the free-energy functional. An interesting property is that the resulting dynamics of concentrations are independent of phase variables chosen. Finite element discretizations for N-phase models can be obtained as a natural extension of the existing discretizations for the two-phase model. The energy dispersion of the numerical solutions can be proved and numerically observed under some restrictions pertaining to time step size. Numerical experiments including the evolution of triple junctions and the spinodal decomposition in a quaternary mixture are described in order to investigate the effect of pairwise surface tensions. (Received September 15, 2016)