1106-65-197 **Amanda E Diegel*** (diegel@math.utk.edu), **Steve Wise**, **Xiaobing Feng** and **Cheng Wang**. *Analysis of Mixed FEMs for Cahn-Hilliard-Flow Models.*

Here I present the analysis of both first order and second order (in time) numerical schemes for Cahn-Hilliard-flow equations. The time discretizations are based on a convex splitting of the energy of the equations and we use a continuous Galerkin discretization of space. Our schemes are unconditionally energy stable with respect to a spatially discrete analogue of the continuous free energy of the system and are unconditionally uniquely solvable. Furthermore, we prove that the discrete phase variable is bounded in $L^\infty(0,T;L^\infty)$ and the discrete chemical potential is bounded in $L^\infty(0,T;L^2)$, for any time and space step sizes, in two and three dimensions, and for any finite final time T. We subsequently prove that these variables converge with optimal rates in the appropriate energy norms in both two and three dimensions. (Received August 08, 2014)