Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Tricriticality in constraint percolation L. CAO, J. M. SCHWARZ, Physics Department, Syracuse University — Constraint percolation goes beyond ordinary percolation to include constraints on the occupation of sites/bonds. For instance, k-core site percolation implements a geometric constraint requiring each occupied vertex on a network have at least k occupied neighboring vertices. It turns out that the percolation transition in such a model is essentially equivalent to the study of a dynamical glass transition in the Fredrickson-Andersen model, one of the models underlying the kinetically-constrained approach to the glass transition. We study hetereogenous k-core bond percolation on a random network with f denoting the probability of a $k = 2$-core vertex and $1-f$ the probability of a $k = 3$-core vertex. This model corresponds to a hetereogeneous extension of the Frederickson-Anderson model. For $f = 1$, the percolation transition is continuous, while for $f = 0$, it is discontinuous. Using a master equation approach, we show that there exists a tricritical point at $f = 1/2$ with a new order parameter exponent of unity. Our results are consistent with other mean field results obtained via a different method. We also look for tricriticality beyond mean field by investigating another constraint percolation model dubbed force-balance percolation.

Liang Cao
Physics Department, Syracuse University

Date submitted: 11 Nov 2011 Electronic form version 1.4