Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Non-perturbative Renormalization Group Study of A Kinetically Constrained Model for Glasses HAI QIAN, The James Franck Institute and Department of Physics, The University of Chicago — We study a dynamic field theory, which is based on the dynamic heterogeneity, with the non-perturbative renormalization group (NRG) method. Dynamic heterogeneity has been observed both experimentally, and in numerical simulations. It may play an important role in the physics of glass transition. Dynamic heterogeneity means that the slow dynamics of glass formers is dominated by the spatial fluctuations. And the length scales of dynamically correlated regions increase when the system approaches the glass transition, together with the increase of time scale. This is similar to the conventional dynamic critical phenomena. People have derived a dynamical field theory for a kinetically constrained model based on the Fredrickson-Anderson (FA) model, which puts the dynamic heterogeneity at its core. Here we study this field theory with the NRG method. The NRG method is not restricted to small parameters, and thus can be applied to more general cases. The critical exponents are calculated, and the phase structure is given. Especially the 1D spatial dimension case, which is difficult for the usual perturbative calculation, is also studied. Other possible models are also mentioned.

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Date submitted: 30 Nov 2005 Electronic form version 1.4