Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Logarithmic Relaxation in Supercooled Liquids JACOB EAPEN, North Carolina State University — Slowly relaxing materials are classified as either strong or fragile with the latter displaying a pronounced non-linear variation in viscosity with temperature. While viscosities are easily measured in an experiment, the attendant relaxations of stresses are not easily accessible. This paper describes a Molecular Dynamics (MD) investigation of the stress relaxations in a supercooled system. The stress correlator in the model fragile system portrays three characteristic variations as a function of temperature with three identifiable cross-over temperatures – To, Tx and Tc. The stress correlator transitions from a power law behavior at high temperatures to an incipient logarithmic variation at a cross-over temperature To. Upon decreasing the temperature, the logarithmic relaxation grows in time and finally breaks down at a second cross-over temperature Tx. In the temperature range between To and Tx, the stress correlator relaxes logarithmically through a dynamically homogeneous crowding mechanism. Tx marks the transition from a logarithmic to a stretched exponential relaxation which coincides with the emergence of dynamical heterogeneity characterized by relatively fast relaxations through strings and small cluster movements.

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Date submitted: 11 Dec 2009 Electronic form version 1.4