Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Recovery from nonlinear creep provides a window into physics of polymer glasses JAMES CARUTHERS, GRIGORI MEDVEDEV, Purdue University — Creep under constant applied stress is one of the most basic mechanical experiments, where it exhibits extremely rich relaxation behavior for polymer glasses. As many as five distinct stages of nonlinear creep are observed, [1] where the rate of creep dramatically slows down, accelerates and then slows down again. Modeling efforts to-date has primarily focused on predicting the intricacies of the nonlinear creep curve. We argue that as much attention should be paid to the creep recovery response, when the stress is removed. The experimental creep recovery curve is smooth, where the rate of recovery is initially quite rapid and then progressively decreases. In contrast, the majority of the traditional constitutive models predict recovery curves that are much too abrupt. A recently developed stochastic constitutive model that takes into account the dynamic heterogeneity of glasses produces a smooth creep recovery response that is consistent with experiment. 1. G. A. Medvedev and J. M. Caruthers, Polymer 74, 235 (2015)

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Date submitted: 03 Nov 2015 Electronic form version 1.4