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**Scott McKinley\***, Mathematics Department, Duke University, Box 90320, Durham, NC 27708-0320, and **M. Gregory Forest** and **Lingxing Yao**. *Transient Anomalous Diffusion in Soft Matter: An Exactly Solvable Model*.

Stochastic models for diffusion of Brownian particles in soft matter (viscoelastic media) play a central role in polymer dynamics and rheology, microrheology, and medical science. A sufficiently robust class of stochastic processes is required to capture the range of observed anomalous diffusive behavior, in particular transient power law scaling of the mean-squared displacement (MSD) of tracked particles. We consider the Generalized Langevin Equation characterized by a Prony series approximation to the relaxation kernel, and study in particular this system in its zero mass limit. Such a study reveals a robust class of models which exhibit transient anomalous diffusion with a scaling law exactly expressible in terms of a parameter characterizing the relaxation spectrum of the GLE. (Received February 10, 2009)