1086-76-837 **Yuriko Renardy*** (renardy@vt.edu), Department of Mathematics, 460 McBryde Hall, Virginia Tech, Blacksburg, VA 24061-0123, and **Kara L Maki** (kmaki@rit.edu), School of Mathematical Sciences, Rochester Institute of Technology, Rochester, NY 14623. *A mathematical perspective on ketchup.*

This is joint work with K. Maki (Rochester Institute of Technology). We present a mathematical perspective to study the dynamics of constitutive models with non-monotonic curves that naturally explains some of the main features of making ketchup flow in shear. The application of some non-zero shear stress is necessary before the material begins to flow or yield. If the applied stress is decreased, then there is some non-zero critical value beyond which the material apparently stops flowing (unyields). The yield stress and unyielding stress depend on the amount of time since the material was last stressed. As an illustration, we use a viscoelastic constitutive model for homogeneous parallel shear flow, and study the dynamics initiated by a step-up or step-down in prescribed shear stress. The model is a modified 'partially extending strand convection' (Larson 1984) model with a Newtonian solvent contribution. We address the case where the relaxation time is large. This introduces a small parameter, so that perturbation analysis with multiple time scales are used in conjunction with numerical simulation of the governing equations. In conclusion, we relate some predictions of the model to published experimental data. (Received September 13, 2012)