1135-74-2216 **Eleni Panagiotou*** (panagiotou@math.ucsb.edu), Department of Mathematics, University of California, Santa Barbara, Santa Barbara, CA 93106, and **Ken Millett** and **Paul Atzberger**.

Topological Approaches for Characterizing in Polymeric Materials the Local and Global Entanglement of Polymer Chains Relevant to Viscoelastic Mechanical Responses.

We develop topological methods for investigating the relationship between polymer entanglement and bulk viscoelastic responses in polymeric materials. We demonstrate our approach by performing three dimensional computational simulations for polymer weaves of different topologies and densities. We perform rheological studies by shearing the material over a broad range of frequencies to establish entanglement-mechanics relationships. We consider regimes ranging from loosely entangled to strongly entangled in the collective polymer chain topology. Our results show that our measures of entanglement can classify the systems according to complexity in a way that reflects their mechanical response. (Received September 25, 2017)