

1123-92-363

**Eleni Panagiotou\*** (panagiotou@math.ucsb.edu), South Hall, UCSB, Santa Barbara, CA 93106, and **Kenneth C Millett** and **Paul J Atzberger**. *Linking polymer entanglements with the viscoelastic mechanics of polymeric materials using topological analysis and computational simulations.*

We investigate how the entanglement of polymeric chains relates to bulk viscoelastic responses in polymeric materials. We show how the structure of the material can be analyzed using results from topology to develop new tools for entanglements. We develop three dimensional computational models to relate entanglement topology, polymer fiber mechanics, to bulk viscoelastic responses of the material. We study in particular woven polymer configurations having similar polymer densities but very different topologies varying from untangled to strongly entangled conformations. We also investigate the role of polymer density. Our approaches provide new mathematical tools for characterizing the origins of the rheological responses of polymeric materials. (Received August 30, 2016)