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Negash G Medhin* (ngmedhin@math.ncsu.edu), Department of Mathematics, North Carolina State University, Raleigh, NC 27695. *Molecular based model for the viscoelasticity of rubber.*

A molecular based model is developed for the viscoelasticity of rubber/elastomers. In developing the model one considers the dynamic response of two types of molecular networks after successive step strains of the rubber medium. The first type of molecular chains are those that are constrained to reptate within an effective tube formed by cross linked network of polymer chains. The second type of molecular chains are the cross linked constraining chains. Then, the Rouse model is incorporated into the stick-slip model proposed by Johnson and Stacer to describe the dynamics of the molecular chains and develop a model for the relaxation process of the rubber medium. (Received September 23, 2005)