PS07

Effects of Topological Constraint for Elasticity of Polymer Networks

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We study the issue of rubber elasticity of polymer networks from the viewpoint of topological constraint. A network topology is conserved because that the entanglement structure of loops which are components of systems does not change - this means that loops are not broken or not joined - when the network is deformed by external forces. We regard the effect as the main cause of the nonlinear elasticity of rubberlike substances and investigate these elastic properties. As the result, the behavior governed by Mooney-Rivlin's law well known as the experimental law of rubber elasticity appears when there are only few entanglements. It is suggested that the contribution of entanglements becomes dominant in the region of large deformation.