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Nanofluidity of Polymer Melt: Two velocity hydrodynamics SERGEI OBUKHOV, University of Florida, ALBERT JOHNER, CNRS Institut Charles Sadron, Strasbourg, France — According to the traditional macroscopic theory, the flow of the entangled polymer melt is associated with the relaxation processes in the network of entanglements. Each entanglement is formed by polymer chains, and these chains are moving randomly along their reputation tubes. Because of this random motion of polymers each entanglement has a finite lifetime. The lifetime is equal to the time needed for a polymer to leave its original tube. We should point out, that the motion of individual polymer chain in a tube is assumed to be completely random (diffusive). It means, that according to traditional theory, in average there is no systematic displacement of polymers with respect to the network of entanglements. The local polymer flow velocity in this theory is just the instant local velocity of individual entanglements forming this network. But the drift of individual polymers provides additional mechanism of a flow of a polymer melt, which becomes dominant at small scale. We suggest two velocity hydrodynamic equations which describe combined contribution of these two mechanisms. For illustration of this method we solve the problem of mobility of a small particle in a polymer melt.

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