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Parameters of slip-springs model of polymer entanglement from the maximum likelihood principle TIMOTHY PALMER, ALEXEI LIKHTMAN, University of Reading, JORGE RAMIREZ, Technical University of Madrid, MARK MATSEN, University of Reading — The slip-spring model for polymer entanglements proposed by A.E.Likhtman [Macromolecules; 2005; 38(14); 6128] replaces entangling chains with slip-links, which are anchored via springs. The use of such models allows reduction of complex multi-chain problem to a simpler single chain problem. In this work we test the slip-spring model on the simplest possible situation: replacing two entangled chains by one chain with one slip-link. We demonstrate how Maximum Likelihood Estimation (MLE) can be used to generate parameters for the slip-spring model by observing a multi-chain system. The test system being considered consists of two Rouse polymer chains that are anchored by the ends in an entangled state. The effect of the entanglement is enforced by rejecting all steps that lead to topology violation. We show how the results of this MLE indicate that slip-link models with slip-links fixed in space are not satisfactory, and demonstrate analytically the dependence of the plateau modulus upon the strength of the slip-spring. Our results contradict recent calculations of Schieber and Horio [JCP; 2010; 132(7); 074905] who claimed that the plateau modulus must be independent of the slip-spring strength.

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