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Retention of polymer molecules in a grooved channel HONGBO MA, JUAN. J. DE PABLO, MICHAEL D. GRAHAM, University of Wisconsin-Madison — Previous studies have shown that for small Reynolds number flow in a smooth channel, polymer molecules tend to migrate towards the channel center due to the wall effects on the hydrodynamic interactions. In this work, we consider instead a structured channel. A bead-spring chain model of a dissolved polymer molecule confined between two solid walls with a cavity on one of them is considered. The solvent is simulated using the Lattice-Boltzmann method. From the simulation, we obtain the probability histogram of the chain center of mass and chain stretch as a function of the spatial position. The effects of Weissenberg number and the Peclet number are discussed in details. We artificially turned the hydrodynamic interactions on and off to reveal their importance. The effect of the flow strength, the geometry, and concentration are summarized. This study clarifies the origin of the retention of polymer molecules in structured microchannels.

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