Coarse-Grained Simulation of Microphase Separation
— Roles of Hydrodynamics in Cylindrical Ordering —

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Block copolymers form various mesoscopic structures (sphere, cylinder, lamella, etc.) depending on their block ratio and temperature. Although the static properties of microphase separation are now well understood [1, 2], the kinetic pathway of the ordering has not been fully understood yet and is a matter of active research. We numerically investigate the kinetics of disorder-to-hexagonal transition, focusing on the roles of hydrodynamic interactions. We found that the hydrodynamic effects, especially hydrodynamic pumping (Siggia’s mechanism [3]), change the kinetic pathway of cylindrical ordering and helps the formation of homogeneous hexagonal phase.

Figure 1: Snapshots of hexagonal ordering from disorder phase with (a) and without (b) hydrodynamic interaction.

References