Diffusion of polymers in concentrated solutions for applications to phase separation

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For modeling phase separation (PS) of concentrated polymer solutions, such as for describing the fabrication of membranes by introduction of a non-solvent or by inducing a temperature change, one needs an adequate description of polymer mobility, or equivalently collective diffusion. However several theoretical models were proposed in literature in the last 40 years without always reaching a clear consensus. Here we report on a test of such different models in the framework of 2D phase-field calculations of PS without hydrodynamics for polymer solutions. It is concluded that the dependence of mobility with concentration is crucial but that the choice of the model is not so critical as far as PS is concerned. This situation could change when hydrodynamics is taken into account.