"Dynamics of a polymer chain confined in a membrane"

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Tuesday, September 27, 10h30

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We present a Brownian dynamics theory with full hydrodynamics for a Gaussian polymer chain embedded in a liquid membrane which is surrounded by bulk solvent and walls. We consider two geometries, namely, a free membrane embedded in a bulk fluid, and a membrane sandwiched by the two walls. Within the preaveraging approximation, a new expression for the diffusion coefficient of the polymer is obtained for the free membrane geometry. We also carry out a Rouse normal mode analysis to obtain the relaxation time and the dynamical structure factor. For large polymer size, both quantities show Zimm-like behavior in the free membrane case, whereas they are Rouse-like for the sandwiched membrane geometry. We use the scaling argument to discuss the effect of excluded volume interactions on the polymer relaxation time.

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