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Multi-scale dynamics and relaxation of a tethered membrane in a solvent by Monte Carlo simulations[1] RAS PANDEY, University of Southern Mississippi, KELLY ANDERSON, The Procter & Gamble Company, BARRY FARMER, Air Force Research Laboratory — A tethered membrane modeled by a flexible sheet dissipates entropy as it wrinkles and crumples. Nodes of a coarse grained membrane are connected via multiple pathways for dynamical modes to propagate. We consider a sheet with nodes connected by fluctuating bonds on a cubic lattice. The empty lattice sites constitute an effective solvent medium via node-solvent interaction. Each node execute its stochastic motion with the Metropolis algorithm subject to bond fluctuations, excluded volume constraints, and interaction energy. Dynamics and conformation of the sheet are examined at a low and a high temperature with attractive and repulsive node-node interactions for the contrast in an attractive solvent medium. Variations of the mean square displacement of the center node of the sheet and that of its center of mass with the time steps are examined in detail which show different power-law motion from short to long time regimes. Relaxation of the gyration radius and scaling of its asymptotic value with the molecular weight are examined.

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