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Membrane Simulations Over Long Length and Time Scales LAWRENCE LIN, UCSB Physics, FRANK BROWN, UCSB Chemistry — We present a simulation algorithm for the dynamical evolution of lipid bilayers over long length and time scales. The membrane is treated as an elastic sheet with bending energy and surface tension and includes hydrodynamic coupling to the surrounding solvent and thermal fluctuations. The method we have developed allows for arbitrary external forces acting on the membrane and is particularly useful for studying many biological processes inaccessible to detailed atomistic simulations. Using this method, we have studied the repulsive interaction between the cytoskeleton and the membrane and its effect on thermal height fluctuations. We present results on the above application, but focus on recent work involving nonthermal fluctuations in membranes due to the activity of protein pumps embedded in the surface. We quantify the influence of these pumps on the height fluctuations in the membrane and discuss the results.

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