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Large Scale Computer Simulation of Erythrocyte Membranes with Explicit Cytoskeleton† CAMERON HARVEY, JOEL REVALEE, MOHAMED LARADJI, University of Memphis, P.B SUNIL KUMAR, IIT-Madras, Chennai, India — The erythrocyte membrane is composed essentially of a self-assembled lipid bilayer and a polymerized protein meshwork, referred to as the cytoskeleton. For the erythrocyte, the polymer meshwork is composed of spectrin and anchored to the bilayer through specialized proteins. In this investigation we extended a coarse-grained model of self-assembled lipid membranes, recently developed by us, to account for the cytoskeleton. Simulation of bilayer patches, with dimensions about 0.5 μm $\times$ 0.5 μm, were performedto investigate the effects of the cytoskeleton on the membrane elastic properties. The bending modulus and surface tension are extracted from the spectra of the out-of-plane thermal undulations of the membrane. Using Monte Carlo, we also extracted the compression and shear moduli. Preliminary findings suggest a measurable effect in thermal undulations resulting from the introduction of the cytoskeleton.

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