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Conformations and Transverse Fluctuations of a Semi-Flexible Chain in Two Dimensions AIQUN HUANG, ANIKET BHATTACHARYA, University of Central Florida, KURT BINDER, Johannes Gutenberg-Universität Mainz — We study conformations and transverse fluctuations of a semi-flexible polymer using Langevin Dynamics simulation in two dimensions(2D). By showing that the end-to-end distance $\langle R_N^2 \rangle$ for a semiflexible chain characterized by its contour length L and the persistence length ℓ_p follows the scaling relation $\langle R_N^2 \rangle \sim L^{1.5} \ell_p^{0.5}$, as proposed by Schaefer *et al.* and Nakanishi, we verify the absence of the Gaussian regime, thus disprove the validity of the worm-like chain (WLC) theory in 2D. We also verify that the bond autocorrelation function exhibits a power law $\langle \vec{b}_i \cdot \vec{b}_{i+s} \rangle \sim s^{-\beta}$ instead of an exponential decay as predicted by the WLC model. We further show that the normalized transverse fluctuations $\sqrt{\langle l_\perp^2 \rangle}/L$ for the semiflexible chains of different persistence length and contour length collapse onto the same master plot as a function of L/ℓ_p, which exhibits $\sqrt{\langle l_\perp^2 \rangle}/L \sim (L/\ell_p)^{0.5}$ and $\sqrt{\langle l_\perp^2 \rangle}/L \sim (L/\ell_p)^{-0.25}$ at two extreme limits $L/\ell_p \to 0$ and $L/\ell_p \to \infty$, respectively and exhibits a maximum for $L/\ell_p \sim 1.0$.

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