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How Universal Are Correlations in Disordered Diblock Copolymers: A Comparison of Three Simulation Models JIAN QIN, University of Minnesota, DAVID MORSE, CEMS at University of Minnesota, MARCUS MUELLER, ITP at Georg-August-Universitat Germany — The Random Phase Approximation (RPA) predicts that the structure function $S(q)$ of symmetric homogeneous diblock copolymer melts is a universal function of χN and a dimensionless wavenumber qR alone, where the Flory-Huggins χ parameter is model-specific N-independent function of more microscopic parameters. More sophisticated coarse-grained theories suggest that $S(q)$ is a function of χN, qR, and the invariant degree of polymerization $\bar{N}$, but that the dominant corrections to the RPA decrease as $\bar{N}^{-1/2}$ with increasing chain length. We have directly tested this extended "corresponding states" hypothesis by comparing simulation results for several chain lengths from three different simulation models (a continuum bead-spring model, an FCC lattice model studied by Matsen and coworkers, and the bond-fluctuation model), by comparing results of different models at equal values of $\bar{N}$. We have devised a method to test universality while allowing for unknown dependences of the effective χ parameter upon the microscopic parameters of each model. The data for both the wavenumber q^* at the maximum in $S(q)$ and for peak intensity $S(q^*)$ are shown to be consistent with the existence of a universal function for $S(q)$ of the proposed form.

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