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Universality in block copolymers: a corresponding states hypothesis JENS GLASER, JIAN QIN, PAVANI MEDAPURAM, DAVID MORSE, Dept. of Chemical Engineering and Materials Science, University of Minnesota — Phase behavior and fluctuations of very long block copolymers are well described by self-consistent field theory, and by the random-phase (RPA) approximation for concentration fluctuations. The SCF / RPA predicts behavior that depends on only a few dimensionless parameters. More sophisticated coarse-grained theories instead suggest an extended form of this principle of corresponding states, in which the behavior is predicted to depend on one additional parameter, the independent degree of polymerization $\bar{N}$. We are testing this prediction by comparing extensive computer simulations of several different coarse-grained simulation models of AB diblock copolymer melts. We utilize a novel simulation methodology based on graphical processing unit (GPU) accelerated hybrid molecular dynamics / Monte Carlo replica exchange simulations on a cluster of many GPUs. We present data for off-lattice models with soft- and hard-core non-bonded interactions, and a lattice model, comparing simulations of different models that are designed to have matched values of $\bar{N}$. The results provide extremely strong evidence for the corresponding states hypothesis, which is found to remain accurate even for chains that are much too short to be accurately described by SCFT or the RPA

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