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Renormalized One-Loop Theory of Fluctuations in Homopolymer Blends and Diblock Copolymer Melts PIOTR GRZYWACZ, DAVID MORSE, University of Minnesota — We construct a perturbation theory for the effects of composition fluctuations in polymer mixtures, which we apply to both binary homopolymer blends and diblock copolymer melts. The inverse structure function is divided into an inverse intramolecular correlation function and a direct correlation function, which are calculated separately to first order in a loop expansion. We show that corrections to mean-field theory that are sensitive to local fluid structure, as reflected by a dependence on the value of a microscopic cutoff length, can be absorbed into q-independent changes in the value of the direct correlation function (which is closely related to the Flory-Huggins χ parameter) and changes in statistical segment lengths. Predictions are presented for the changes in radii of gyration of chains in a binary solution near the critical point (which are extremely small) and for the behavior of the stucture factor in a block copolymer melt near the order-disorder transition.

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