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Simultaneous determination of the interaction parameter and topological features of polymers in dilute solutions DURGESH RAI, Oak Ridge National Laboratory, GREGORY BEAUCAGE, University of Cincinnati, RAMANTH RAMACHANDRAN, Procter & Gamble, KEDAR RATKANTHWAR, Swami Ramanand Teerth Marathwada University, NIKOS HADJICHRISTIDIS, King Abdullah University of Science and Technology, HONG KUNLUN, DAVID UHRIG, Oak Ridge National Laboratory, ANDY TSOU, ExxonMobil Research & Engineering Company — The Random Phase Approximation (RPA) using the Debye polymer chain scattering function has been widely used for analysis of small angle neutron scattering (SANS) data in order to model polymer blends of linear chains in the melt where it is safe to assume a Gaussian conformation. Nevertheless, Gaussian scaling is not applicable when the polymer chains display more complicated topologies or when the chains are in dilute solutions. In order to explicitly determine the nature of chain scaling, related to topology or solvent quality, as well as to quantifying the thermodynamic interactions, a coupling of the unified scattering function with the RPA equation and Benoit's approach to model inter-arm and intra-arm interactions is proposed to analytically quantify thermodynamic effects along with topological variations using the proposed scaling model. Detailed topological quantification of star polymers systems have been able to describe both, good and theta solvent conditions along with effects of functionalities, as well as resolve deviations in chain conformations due to steric interactions between star arms.

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