

Abstract Submitted  
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**Correlation properties of dipole systems** YURI POPOV, PHILIP TAYLOR, Case Western Reserve University — We study theoretically the effects of electrostatic dipole- dipole interactions in ionomers, and the correlation properties of dipoles attached to either low-molecular-weight fluid or polymer chains. In particular, we study orientation-orientation correlations in systems of physical (extended) dipoles with relatively weak dipole moments. Correlation corrections to the free energy in such dipole systems are different from those in systems of point charges described by the Debye theory. The underlying physics, however, is similar: nearby dipoles rearrange around a given dipole in order to compensate for changes in its dipole moment and thus provide electrostatic screening. We develop both a simple Poisson-Boltzmann-like theory for such screening and a field-theoretic approach, which provides a natural language for describing such phenomena in a polymer context. New correlation lengths are obtained.

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