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Diffusion of Magnetized Binary Ionic Mixtures at Ultracold Plasma Conditions[1] KEITH R. VIDAL, SCOTT D. BAALRUD, University of Iowa — Ultracold plasma experiments offer an accessible means to test transport theories for strongly coupled systems. Application of an external magnetic field might further increase their utility by inhibiting heating mechanisms of ions and electrons and increasing the temperature at which strong coupling effects are observed. We present results focused on developing and validating a transport theory to describe binary ionic mixtures across a wide range of coupling and magnetization strengths relevant to ultracold plasma experiments. The transport theory is an extension of the Effective Potential Theory (EPT), which has been shown to accurately model correlation effects at these conditions, to include magnetization. We focus on diffusion as it can be measured in ultracold plasma experiments. Using EPT within the framework of the Chapman-Enskog expansion, the parallel and perpendicular self and interdiffusion coefficients for binary ionic mixtures with varying mass ratios are calculated and are compared to molecular dynamics simulations. The theory is found to accurately extend Braginskii-like transport to stronger coupling, but to break down when the magnetization strength becomes large enough that the typical gyroradius is smaller than the interaction scale length.

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