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Diffusivity effects on charged species separation in nanochannels DAVID BOY, FREDERIC GIBOU, IGOR MEZIC, SUMITA PENNATHUR, UC Santa Barbara — Recent work has investigated the dispersion and separation of charged molecules in nanochannels. One conclusion has been that the combination of transverse velocity and electric field gradients can provide a mechanism for separation of different-valence ionic species. Building on this, we present a continuum transport model for finite-sized particles in a nanofluidic system and analyze the model both theoretically, with Taylor-Aris dispersion theory, and computationally, with direct numerical simulation. We assume a finite-sized electric double layer, a dilute solution, and an axially applied DC electric field. We show that, under these conditions, finite-sized particles may exhibit qualitatively different separation behavior than predicted by small ion theory.

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