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**On fluid modeling of plasmas and connections to aqueous electrokinetics**[1] ARUNRAJ BALAJI, SHAHAB MIRJALILI, ALI MANI, Stanford University — Though similar to the Poisson-Nernst-Planck model for the transport of charged species in aqueous electrolytes, the fluid model for ion and electron transport in non-thermal plasmas must consider several additional phenomena. Bulk reactions, boundary fluxes, strong species asymmetry, and large/rapidly-oscillating applied voltage all contribute to the complex behavior of such plasma systems. Plasmas provide a novel context in which the effects of these phenomena can be studied, particularly in regimes that exceed the typical conditions observed in aqueous electrolytes. In this work, an existing AC electrokinetics solver is adapted to simulate a 1D non-thermal plasma. Structures and patterns in the distribution of charged species are identified and characterized. Connections to aqueous electrokinetics are explored, particularly with regard to the effects of strong bulk reactions, boundary fluxes, species asymmetry, and large/rapidly-oscillating applied voltage. The findings of this work reveal behavior that might be observed in extreme problems in aqueous electrokinetics and connections between these phenomena and typical observations in the study of non-thermal plasmas.

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