

Abstract Submitted  
for the DFD16 Meeting of  
The American Physical Society

**Singularities of the charge transport equation**<sup>1</sup> OMAR MATAR, ALEX WRAY, DEMETRIOS PAPAGEORGIU, Imperial College London, QIMING WANG, New Jersey Institute of Technology — It has long been known (since the work of Taylor in the 60s) that electrohydrodynamic interfacial flows can exhibit singularities exemplified by the so-called ‘Taylor Cone’, for instance. Despite the large attention devoted to such flows in the literature, achieving fundamental understanding of these singularities has proved elusive. This is also in spite of the observation that certain parameter regimes appear to demonstrate the unusual phenomenon of cusp-like touchdown (as reported by Wray et al., 2013, to be discussed in the talk). Via the use of mathematical analysis, low-order models, and direct numerical simulations, we classify these singularities and isolate their underlying causes. We also demonstrate where they deviate from experimental predictions, and investigate how such discrepancies may be resolved.

<sup>1</sup>EPSRC UK platform grant MACIPh (EP/L020564/1) and programme Grant MEMPHIS (EP/K003976/1)

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Date submitted: 29 Jul 2016

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