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Simulations of Thermionic Emission, Collisions and Ion Trapping in Multidimensional Plasma Systems, and Illustration of a Technique to Identify the Sheath Regime Around Emissive Probes[1] GRANT JOHNSON, MICHAEL CAMPANELL, Lawrence Livermore Natl Lab — Using a recently developed 2D-2V kinetic continuum code designed to study effects of strongly emitting surfaces on plasmas with collisions, we have shown that multiple dimensions introduce new sheath effects [1] that are not captured in previous 1D simulations of emitting surfaces. Analysis of the sheath physics, current flow and potential distributions in various 2D configurations including floating and biased emissive probes, filament discharges, and surfaces with nonuniform emission have demonstrated multidimensional extensions of inverse and space-charge limited sheath regimes. Using emissive probe simulations, we introduce a methodology that one could use in experiments to differentiate classical, space-charge limited and inverse regimes by the probe's current response. [1] G. R. Johnson, M. D. Campanell, and M. V. Umansky "Effects of emitting surfaces and trapped ions on the sheath physics and thermionic current flow in multidimensional plasma systems", submitted

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