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The Influence of Anode Size on Bulk Plasma State: Simulation, Theory, and Experiment[1] MATTHEW HOPKINS, BENJAMIN YEE, EDWARD BARNAT, Sandia National Laboratories, SCOTT BAALRUD, University of Iowa — We present recent PIC modeling results in pursuit of identifying the relationship between bulk plasma characteristics and a biased anodic surface. In the limit of small anode size we expect the anode to operate as an ideal probe and exhibit no significant influence on the bulk plasma state. In the other limit of a large anode size we expect the bulk plasma to "lock" onto the anode potential and the plasma state to be heavily influenced by the anode potential. Our investigations include the plasma-anode interface (sheath) structure, plasma potential, and plasma electron energy distribution function modification. The basis for our investigation lies in the plasma-anode interface model from Baalrud, et al.[2] In particular, we target the transition from ion-rich sheaths to electron-rich sheaths at the anode. The theoretical model predicts a transition as a function of the anode-to-wall area ratio, A_A/A_W. Comparisons are made between the simulation model, theoretical model, and experimental results. Considerations specific to modeling are also presented.

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[2]Baalrud, Hershkowitz, Longmier, "Global nonambipolar flow: Plasma confinement where all electrons are lost to one boundary and all positive ions to another boundary," Phys. Plasmas **14**, 014109 (2007).

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