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Locking the Plasma Potential with an Anodic Surface[1] MATTHEW HOPKINS, BENJAMIN YEE, EDWARD BARNAT, Sandia National Laboratories, SCOTT BAALRUD, BRETT SCHEINER, University of Iowa — It is often assumed that a small positively biased electrode immersed into a bulk plasma has negligible impact on the bulk plasma properties, including the plasma potential. This is an assumption in many diagnostic devices, such as a Langmuir probe. In this poster we present a detailed study including simulations and experiments to determine the size scales when such an immersed positive interface has non-negligible impact on the plasma [1]. That is, we answer the question, what is the largest size for an anodic surface before it influences the plasma?. Letting $\mu = \sqrt{2.3 m_e/m_i}$, we find that if the ratio of anode area (A_A) to grounded wall area (A_W) $A_A/A_W 1 \times \mu$, we can expect little impact on the bulk plasma, but as $A_A/A_W \to 1.7 \times \mu$ we see significant influence, and at $A_A/A_W 1.7 \times \mu$, we expect the plasma potential to become locked to, and therefore controlled by, the anode potential. [1] Hopkins, Yee, Baalrud, Barnat, Phys. Plasmas 23, 063519 (2016).

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