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Probe measurements in electronegative plasmas: modeling the perturbative effects of the probe¹ E.A. BOGDANOV, A.A. KUDRYAVTSEV, K. YU. SERDITOV, St. Petersburg State University, St. Petersburg, Russia, C.A. DEJOSEPH, JR., AFRL, Wright-Patterson AFB, OH, V.I. DEMIDOV, UES, Dayton, OH — A basic property of an electronegative plasma is its separation into two distinct regions: an ion-ion region far from boundaries and a near-boundary electron-ion region, where negative ions have practically negligible density. This is due to the influence of the ambipolar electric field, which depends on electron (not negative ion) plasma parameters. This electric field "holds off" negative ions from the boundary, as the ions have lower mobility and temperature compared to the electrons. Therefore, negative ions will be repelled by any object inserted into the plasma. This can lead to errors in measurements of negative ion parameters by any invasive method. Numerical modeling of electric probes in an argon-oxygen plasma clearly demonstrates possible errors of direct measurements of negative ion current. This can also affect results from the photo-detachment method and direct measurements of negative ion energy distribution.

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Charles DeJoseph, Jr. Air Force Research Lab

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