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Magnetic field effect on cylindrical impedance probe diagnostics[1]
DAVID WALKER, Sotera, Inc, RICHARD FERNSLER, DAVID BLACKWELL, WILLIAM AMATUCCI, Naval Research Laboratory — To test geometry independence predicted theoretically in earlier work with spherical impedance probes,[2] we used a 100-1 (length – radius) aspect ratio cylindrical probe. In the impedance measurements, a network analyzer supplies a millivolt driving rf signal and plasma diagnostics are based on the real and imaginary parts of the complex plasma impedance returned by the analyzer for a given probe bias. The theoretical basis of the work indicates that in the thin sheath limit the results should be independent of probe geometry. With probe alignment along a small magnetic field $\sim$ 2 gauss, we compared the cylinder's impedance-based plasma measurements to those for which we swept the same cylinder as a Langmuir probe.[3] In both cases the impedance probe format showed a higher density, the same plasma potential, and a comparable electron temperature to the Langmuir sweep. We will present recent data showing the effect of varying the orientation and magnitude of the applied field.

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[2]D.N. Walker, R.F. Fernsler, D.D. Blackwell, W.E. Amatucci, *Phys. Plasmas* **17**, 113503 (2010)
[3]*NRL Memorandum Report 6750-11-9331* (2011)

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