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Determining plasma potential and the electron energy distribution using an rf impedance probe[1] DAVID WALKER, GTEC, Inc, RICHARD FERNSLER, DAVID BLACKWELL, WILLIAM AMATUCCI, Naval Research Laboratory — In earlier work[2,3] using spherical probes we have demonstrated the usefulness of a network analyzer in plasma diagnostics in the thin sheath limit. The instrument returns both real and imaginary parts of the complex plasma impedance as a function of frequency for given bias voltages. To determine these quantities, an rf signal, much smaller than bias voltages, is applied to the probe by the network analyzer. Plasma impedance is determined by comparing the incident signal to that reflected from the plasma. This information can be used to determine sheath resistance, sheath density profiles and, a technique for measuring electron temperature. In the present work we focus on a method for finding plasma potential and the electron energy distribution. The rf method has general application to diverse areas of plasma investigations in the laboratory or in space. It can be used with *in situ* instrumentation and can be extended to provide an estimate of sheath structure.

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[2]Phys. Plasmas 13, 032108 (2006)
[3]Phys. Plasmas 15,123506 (2008)

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