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Plasma Impedance Tomography for Imaging Plasma Dynamics ERIK TEJERO, AMI DUBOIS, GEORGE GATLING, LON ENLOE, DAVID BLACKWELL, United States Naval Research Laboratory, DAVID WALKER, MacAulay-Brown, Inc., BILL AMATUCCI, United States Naval Research Laboratory — Plasma impedance probes measuring the self-impedance of the antenna-plasma system have been shown to provide accurate measurements of electron plasma density for space and laboratory plasmas. Plasma impedance probes measuring the mutual impedance between two antennas and a plasma dielectric have been successfully flown on sounding rockets and satellites. At the US Naval Research Laboratory, we have recently developed a noninvasive method for generating real-time images of plasma density and magnetic field. The method consists of measurements of the complex mutual impedance between elements of an antenna array and an image reconstruction algorithm. The impedance spectra are collected after a short pulse has been applied to each element in sequence. These spectra provide path-independent information about the plasma dielectric that are used to reconstruct images of plasma density and magnetic field. The goal is to develop a system capable of providing tomographic reconstructions at a rate of a 0.1% of the peak plasma frequency of the system. Recent numerical and experimental results will be presented.

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