

Abstract Submitted
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Rapid Formation of Distributed Plasma Discharges using X-Band Microwaves¹ XUN XIANG, BRIAN KUPCZYK, JOHN BOOSKE, JOHN SCHARER, University of Wisconsin — Observations of rapidly formed (50-300 ns) distributed plasma discharges using X-band microwaves are presented. Two discharge test chambers are used to observe microwave breakdown in Ar and Ne gas from 10 to 760 torr. One is a brass rectangular WR650 waveguide and the other is a cylindrical stainless steel chamber, both enclosed with polycarbonate windows. The chamber is illuminated by the output of 25 kW, 0.8 μ s pulse-width, 9.382 GHz magnetron through an X-band waveguide pressed against the polycarbonate window. Measured incident, reflected, and transmitted microwave power to a movable monopole antenna located beyond the discharge chamber are used to detect the discharge and attenuation characteristics as the pressure is varied. Observations of localized transmission spike measurements of -20 dB that occur within 50 ns caused by the plasma under certain conditions have been made. Additionally, an ICCD provides fast (10-50 ns) time-scale optical images of the plasma, revealing the plasma formation and decay processes. Progress on a Ku band interferometer and optical emission spectroscopy diagnostics will be discussed. Plasma modeling is used to compare the experimental data with theoretical behavior.

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John Scharer
Univ. of Wisconsin

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