Abstract Submitted
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Computational studies of the frequency response of impedance characteristics of a plasma capacitor[1] SAURAV GAUTAM, University of California Merced, GABRIELE MORRA, Department of Physics, University of Louisiana at Lafayette, VENKATTRAMAN AYYASWAMY, University of California Merced — Microplasmas ignited at atmospheric pressure provide a useful building block for the development of tunable electrical and electronic components with potentially useful properties that cannot be achieved by traditional electronic components. One such attractive property is the negative capacitance that can be demonstrated by plasmas at input frequencies higher than the plasma frequency. While simple analytical models assuming a fixed electron number density can be used for preliminary analysis of impedance characteristics of microplasmas, the strong spatial gradients make it necessary to use numerical methods for more accurate analyses. In this talk, we present computational studies of the impedance characteristics and its frequency dependence in the microwave frequency regime for a microplasma capacitor. The microplasma is ignited using a specified input power at a frequency of 100 MHz with an additional low-voltage (about 1 V) high-frequency input signal used to analyze the frequency response of the reactance. The low-voltage input signal ensures that its influence on the baseline plasma is negligible. The impedance variation shows negative capacitance (positive impedance resembling an inductor) at a certain frequency which can be tuned by modifying the input power delivered to ignite the plasma.

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