Abstract Submitted
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Self-Consistent Circuit Model for Pulsed Inductively Coupled Plasmas[1] CARL SMITH, JOEL BRANDON, STEVEN SHANNON, North Carolina State University, PENG TIAN, MARK KUSHNER, University of Michigan, SANG-KI NAM, Samsung Electronics — Pulsed inductively coupled plasma discharges show promise in industry due to increased chemistry control and decreased substrate damage. Coupling circuit effects from power delivery and antenna structures with a self-consistent plasma model enable an integrated design approach that includes the entire power delivery network. This model has demonstrated distinct regimes where the power delivery network can dictate transient properties moreso than the behavior of the plasma: *1)* Circuit effects depress the magnitude of delivered power and the time response of T_e, and n_e during the pulse onset. Novel approaches for power coupling optimization and plasma transient control are identified enabling passive control of dn_e/dt and dT_e/dt. *2)* The influence of modest dissipative elements in the power delivery network and antenna on the plasma transient behavior are shown to demand a more detailed treatment than traditional insertion loss type models. *3)* A methodology for matching steady state and transient conditions to experimental data by scaling the effective area term is used as part of an experimental validation effort and may be extended to steady state models.

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