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Incorporation of transient dependent feedback mechanisms in the inductive transformer matrix model: implications on pulsed power delivery[1] CARL SMITH, STEVEN SHANNON, North Carolina State University, SANG-KI NAM, Samsung Mechatronics Research Division — Many of the assumptions made by equivalent circuit models of inductively coupled plasmas make accurate modeling of these discharges under transient conditions inaccurate, particularly in cases where power is being applied. Lossless power delivery to the plasma, a thin skin depth approximation for the plasma transformer, and an assumption of a Maxwellian EEDF throughout the duration of the transient all contribute to significant deviations when compared to experimental observations. Various feedback mechanisms are accounted for in this work, which include- the incorporation of a lump sum circuit model into the transformer matrix equivalent circuit model, the accounting for a finite skin depth dependence in the transformer model, and the incorporation of a transient dependent EEDF that is modulated by the evolution of n_e and T_e over the course of a plasma pulse. Integration of these terms into a transformer circuit model reveal that dT_e/dt, and dn_e/dt both show a significant delay over the course of a plasma pulse. The impact of these terms on the plasma model and a comparison to experimental results will be presented.

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