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Predictive Model of E-H Mode Transition Power Level SHAUN SMITH, DAVID COUMOU, MKS Instruments — Inductively Coupled Plasma sources driven by RF power are well adopted for high-volume manufacturing of semiconductor devices. The vexing challenge to the utility of these plasma processing reactors is the existence of the E-H mode transition. Industry notably avoids the process region associated with this transition, where plasma instabilities prohibit reliable RF power delivery. Simulation of the electrical properties of the power delivery circuit coupled with a simple model of the plasma response are shown to be sufficient to quantitatively predict the power level of the E-H transition as well as suggest a mechanism for the mode transition. This modeling is compared with experiment to show behavior which is explained by the presented model. This work provides support for a self-consistent model of the E-H instability based on the power flow stability of the power delivery system

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