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Computational Modeling of Microwave Interactions with Self-consistent Plasma ROCHAN UPADHYAY, Esgee Technologies Inc., LAXMINARAYAN RAJA, The University of Texa at Austin — Computational modeling of microwave plasma needs to resolve several observed phenomena occurring in microwave-sustained plasmas. This is a challenging task as while the microwave wavelength is of the order of millimeters or more, several phenomena of microwave plasma interactions occur in the range of micrometers or less. Examples include the skin effect in over-dense plasma, the epsilon-zero resonance and subsequent enhanced power deposition at the critical density interface, the structure of SPP (Surface Plasmon Polaritons) in plasma dielectric interfaces, Microwave-(sheath)Voltage Plasma (MVP) etc. We will briefly present several examples of computational simulations, using a self-consistent fluid plasma model coupled with full field electromagnetic simulations for industrial scale plasma reactors for which the above physical mechanisms are the main processes for the creation and sustenance of the plasma for material processing applications. We will focus on two problems, namely discharges sustained by surface wave propagation (SWP) along plasma- dielectric interface (SPP) and by SWP along the plasma-sheath interface (MVP). Computational simulations illustrate the differences between the two types of discharges and the dependence of plasma on external parameters.

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