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Self-consistent modeling of a linear microwave plasma source STEFAN MERLI, ANDREAS SCHULZ, MATTHIAS WALKER, IGVP, University of Stuttgart — Microwave plasmas have a wide range of technical applications such as thin film deposition, etching, surface activation or gas conversion. The Duo-Plasmaline, a linearly extended low pressure microwave plasma source, is particularly suitable for such purposes because it can be extended to several meters in length and can produce large volume, high density plasmas. To better understand the processes occurring in these plasmas, a self-consistent numerical model is used to investigate the spatial and temporal evolution of hydrogen discharges. An FEM-based fluid-plasma model, which is coupled to the Maxwell's equations for the microwave field is used. A reduced set of reactions, including electron impact collisions, heavy particle reactions and wall reactions, is considered. The distribution of important plasma quantities, such as electron density and energy, as well as the densities of ionized, excited, and neutral species are studied in terms of gas pressure and microwave power. The simulation results are compared with experimental data.

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