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Hollow radial electron density profiles in surface wave discharges. An inside job?[1] MANUEL JIMENEZ-DIAZ, SARA RAHIMI, EMILE A.D. CARBONE, JAN VAN DIJK, Department of Applied Physics, Eindhoven University of Technology — In many microwave excited plasmas, there is a part of the discharge (tube) hidden from optical access e.g. because of the metal parts that cover it; it is the region where the transformation occurs between the EM modes found in the (metal) waveguide to modes in the plasma (waveguide). Because in most of cases optical access is not an option here, studies of this region remain scarce. Regardless of this, it is a well-known fact that the discharge tube can easily break due to the high temperatures inside the launcher of surfaguide discharges, which means the temperature is higher there than in other regions of the plasma. In this work, we use a 2D model to show how the inner region changes for increasing power absorbed and electromagnetic wave frequency. The shaping of the EM coupling into the plasma region by the cavity is explored as well. We discuss when the hollow radial profiles for the electron density appear in a surfaguide plasma, and how they are related to the radial inhomogeneity of the EM fields and the plasma properties (e.g gas temperature). All these results were obtained using the modeling platform Plasimo.

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