Abstract Submitted
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Physics and modeling of microwave streamers. Resonant effects and branching.[1] B. CHAUDHURY, L. PAPAGEORGIOU, J.P. BOEUF, O. PASCAL, LAPLACE, CNRS and Universite de Toulouse, France — Breakdown in a microwave field at atmospheric pressure leads to the formation of a plasma array that moves toward the source (Chaudhury et al., Phys. Plasma 17, 123505 (2010)). When a linearly polarized microwave field is intercepted by a spherical mirror, it is possible to limit the breakdown region to a single central antinode of the field (Vikharev et al., Sov. J. Plasma Phys. 18, 554 (1992)). Breakdown in these conditions leads to the formation of a plasmoid that elongates in the direction of the field and forms a "microwave streamer." On the basis of a numerical model coupling Maxwell equations with a simple description of the plasma, we describe the physics of microwave streamer formation and elongation. When the microwave field is slightly over breakdown the growth of the microwave streamer stops when its length is around one half wavelength because of resonant effects. Due to intense power deposition in the microwave streamer, gas heating and subsequent gas density drop may become important and strongly modify the structure of the microwave streamer. The simulation predicts the formation of a complex "branching" of the initial filament, that is qualitatively similar to the experimental observations.

[1]Work performed in the frame of the RTRA STAE PLASMAX project.

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