

Abstract Submitted
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Diffusion-ionization plasma propagation and pattern formation during microwave breakdown GUO-QIANG ZHU, BHASKAR CHAUDHURY, JEAN-PIERRE BOEUF, LAPLACE (LABoratoire PLASma et Conversion d Energie), CNRS and Universite de Toulouse, France — A 1D model of the expansion of a collisional plasma under the combined effect of diffusion and ionization is presented. It is shown that a simple quasi-neutral model of the plasma using an effective diffusion coefficient can accurately describe the plasma front propagation. The effective diffusion coefficient describes the transition from free electron diffusion in the plasma front to ambipolar diffusion in the bulk. Comparisons with “exact” solutions from a drift-diffusion Poisson model show excellent agreement in the simple case of a constant ionisation frequency, but also when the plasma front propagation is due to microwave breakdown. In the latter case the plasma model is solved together with Maxwell’s equations and the ionisation frequency in the front is modulated in time due to the formation of standing waves in the plasma front region, leading to the formation of plasma patterns.

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