Abstract Submitted
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A new mechanism for pattern formation in low-pressure RF plasmas NICOLAS PLIHON, Laboratoire de Physique, ENS de Lyon, CNRS, France, JEAN-LUC RAIMBAULT, Laboratoire de Physique des Plasmas, CNRS, Ecole Polytechnique, France, ALEXANDRE POYÉ, Laboratoire de Physique, ENS de Lyon, CNRS, France, PASCAL CHABERT, Laboratoire de Physique des Plasmas, CNRS, Ecole Polytechnique, France, VICTOR DÉSANGLES, Laboratoire de Physique, ENS de Lyon, CNRS, France — Striations, as plasma self-organization, emerge from an ionization instability in DC discharges. Similar patterns have been reported in RF discharges, but the physical origin remained unknown. We propose a mechanism from a fluid model in which transport coefficients have been computed from a 0-D kinetic model [1]. In the quasineutral regime, the electron flux Γ_e and the energy flux H_e are expressed as a function of the plasma density gradient ∇n_e and electronic temperature gradient ∇T_e and transport coefficients D_a, μ_e, χ_e and κ_{e} (e.g. for energy $H_e = \chi_e \nabla n_e + \kappa_e \nabla T_e$). When the electron distribution is non-Maxwellian, off-diagonal terms χ_e and μ_e may be non-zero and unstable regimes may develop. Using the BOLSIG+ kinetic model at low Ar pressure, we showed that off-diagonal terms may be sufficiently negative to overcome diffusive effects, leading to an instability. This model reproduces all experimental features observed in an annular RF plasma: (1) axisymmetry is broken above a critical pressure, (2) azimutal modulations of the plasma iincreasing with pressure, (3) axisymmetry is recovered at higher pressure. [1] Désangles et al., *Phys. Rev. Lett.* **123**, 265001 (2019)

Nicolas Plihon
Laboratoire de Physique, ENS de Lyon, CNRS, France

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