Self-organization in radiative plasmas

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Abstract

Nonlinear self-sustained oscillations of Belousov-Zhabotinsky type were predicted for radiative plasmas theoretically [1]. Inharmonic oscillating solutions for incompressible carbon plasmas were obtained using expansion in series over oscillation amplitudes. It was shown also that purely harmonic oscillations might take a place. In this work the nonlinear oscillations are found in compressible radiative plasmas for exact functions for ionization-recombination rates and radiation intensities. The averaged temperature for compressible plasmas is lower than for incompressible one. Pure harmonic nonlinear oscillations are found. As it shown in Ref. [2], the temperature oscillations produce the nonlinear shift of ionization equilibrium without any decrease of input power. Hence, the self-sustained oscillations may be used in order to increase the ionization level in plasma shooters and to enhance their efficiency.

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