MULTIPARAMETRIC PIC SIMULATIONS OF ELECTRON VORTICES IN RELATIVISTIC LASER PLASMAS

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The formation of localized coherent structures in the process of interaction of intense laser radiation with matter is an important area of research in the field of laser plasma. The formation of these structures is manifested in experiments with laser acceleration of ions, in the "quick ignition" paradigm in experiments on controlled thermonuclear fusion, in experiments in the modes of Warm Dense Matter and High Energy Density and in laboratory astrophysics (see [1,2] and references inside).

This paper is devoted to multiparametric numerical modeling of the dynamics of one of the types of these structures - relativistic electron vortices. The evolution of electron vortices in plasma c is simulated using a two-dimensional implementation of the particle-in-cell method within the framework of the REMP code [3]. It is shown that the post-soliton stage of the evolution of the electron vortex can be described with high accuracy by the "snow plow" model [4], the characteristic time of the electron vortex decay into small electronic vortices depends on the characteristic parameters of the vortex, and the destruction of the vortex boundary and its transformation into a series of small Vortices and anisotropization of the motion of uncompensated protons [5]. These results are of interest for the diagnostics of experiments on laser devices of a new generation [6].

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