CONVERSION AND TRANSPORTATION OF THE INTENSE ION BEAMS IN SCATTERING MAGNETIC LENSES

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The paper describes the problem of the conversion of the intense ion beams convergent on the axis to the quasi-cylindrical beams or to the long-focus beams by the scattering magnetic lenses with the topology of the magnetic field $B = f(1/r)$ и $B = f(r)$. The first ion-optical system is a toroidal lens with an axial current filled with plasma from an additional source to neutralize the space charge of the beam. The second system is a cylindrical plasma channel with a longitudinal current. The trajectories of the motion of the ions in the single-particle approximation were calculated. The properties of the scattering magnetic lenses were considered on the example of the conversion of ion beams with a spherical and a tapered focusing. An important feature of the ion movement is the realization of the asymptotic approaching of the ions to the axis of the plasma scattering channel at a certain critical value of the current in the channel. The dependence of critical current in the channel on the input parameters of ions is presented in the work.

Keywords: intense ion beams, plasma lenses, ion beam transportation.