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Analytical Study of the Conditions of an Electron Beam Steady Transport in a Plasma

Dynamics of an axial-symmetric electron beam moving in a rarefied plasma is investigated analytically. The model based on Kapchinsky-Vladimirsky approach is applied, which is valid up to the beam currents near Alfvén limit. In approximation of a quasi-neutral regime the nonlinear equation for the beam radius is solved, the results of its numerical integration are presented. The conditions of stationary and quasi-stationary beam transport in a plasma environment are found in dependence on the initial parameters such as beam transverse emittance, beam current and beam transverse size.

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