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NUMERICAL SIMULATION OF THE FEATURES AND REGULARITIES OF THE HIGH-POWER DENSITY ION BEAM FORMATION*

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The development of methods for modifying materials based on the synergistic of high-intensity implantation and simultaneous energy exposure is intended at creating deep ion-doped layers. For this purpose, it is proposed to use pulsed and repetitively-pulsed beams of metal and gas ions of micro-submillisecond duration with a high-pulsed power density. The paper presents the results of numerical simulation of forming the pulsed and repetitively-pulsed high-intensity ion beams. Simulations were performed using the Karat code [1]. The ballistic focusing of heavy ions was studied at injection current densities from 0.1 to 3 A. The influence of the ion current density, accelerating voltage, ion charge composition, and conditions for neutralizing the beam space charge on the transport and focusing of a high-power ion beam has been studied. The conditions for the appearance of a virtual anode have been determined and studied. It has been found that for long durations of ion beam formation at low pressures of the residual atmosphere, multiple appearance and disappearance of a virtual anode are possible. The possibility of ballistic ion beam formation with a pulse density of hundreds of kilowatts per square centimetre has been shown.

REFERENCES

[1] V.P. Tarakanov, User's Manual for Code KARAT, Berkeley Research Associates Inc, Va: Springfield, 1992.

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