ION BEAM DEFLECTION IN FOCUSING MAGNETICALLY INSULATED ION DIODES WITH PASSIVE ANODE

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High-intensity pulsed ion beam deflection are investigated and compared in two types of focusing magnetically insulated ion diodes (MID) of the passive anode, i.e. with external magnetic insulation and self-insulation of electrons. The anode plasma formation processes are also varied for the external- and the self-magnetic field MID, either based on surface breakdown of dielectric covering on the anode (an one-pulse mode) or explosive electron emission (a two-pulse mode). Typical energy density per pulse is in the range of 3–6 J/cm^2, at an accelerating voltage of 200–300 kV with a pulse duration of 120–150 ns. IR-diagnostics with the spatial resolution 1 mm is employed for analysis of the ion beam. The ion beam deviation is about ± 1.5 mm for external-magnetic field MID and ± 2.5 mm for the self-magnetic field MID, leading to a fluctuation in the energy density of 10–12 % and 10–27 % within 10 mm range at the focal point, respectively. It is shown that displacement of different parts of a beam cross-section is nonsynchronous, revealing that ion beam deflection is mainly caused by processes in anode-cathode gap other than in the transportation region.

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