

Electrostatic RID Experiment

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The ITER NBI is designed with use of a residual ion dump (RID) which has to provide electrostatic deflection and dumping of negative and positive ions, escaping from a neutraliser. This device looks more compact in compare with traditionally used systems with a magnetic field deflection of ions but up to now newer was tested in neutral beam injectors. In the ITER beam line the RID has to work in the presence of stray magnetic field with mainly vertical component, so the main physical question is in secondary electrons production and their behaviour in the crossed electric and magnetic fields, that can have an influence on the high voltage holding and state of operability.

Experimental investigation of the electrostatic RID concept is now started at test stand IREK in the Kurchatov Institute. This experiment uses positive ion beam and two panels (one panel is under negative potential) which simulate the RID channel. The panels are placed inside a special magnetic system which produces rather uniform vertical magnetic field in the RID volume.

Beam parameters. At ion source exit grid: 50 keV, 30 A H^+ , 1 c; neutralisation efficiency is about 60%; residual ion current 10 A, beam size at the RID entrance is about 14x45 cm.

RID parameters. Channel width is 15 cm, panels axial length is 1 m and height is 0.8 m. Applied negative potential is 10 kV, secondary electrons production is evaluated as 30 A.

The magnetic system is designed to provide magnetic field up to 120 Gs that gives the ability to carry out an investigation of the residual ion beam deflection in horizontal plane and its damping on the RID panel with use of magnetic field only (Magnetic RID).

The paper will present the RID description and first experimental results.