IAEA FEC 2014

Contribution ID: **169** Type: **Poster**

Fast Particle Behavior in Globus-M

Tuesday 14 October 2014 08:30 (4 hours)

Behavior of the fast particle population, arising during 20-30 keV hydrogen and deuterium neutral beam injection in the hydrogen and deuterium plasmas, is investigated. Experiments revealed large fast ion losses. Experimental results are confirmed by different types of modeling: simulation with the NUBEAM module, solution of Boltzmann kinetic equation with Landau collision term and full 3D fast ion tracking algorithm. Dynamics of the energetic particle losses during the sawtooth oscillations and Alfven eigenmodes is investigated. Losses, induced by these instabilities, may exceed 25%. A way to decrease fast ion losses in present conditions is shown. Modeling for the Globus-M2 tokamak is performed. Simulations predict essential improvement in the fast ion confinement.

Paper Number

EX/P1-33

Country or International Organisation

Russian Federation

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Session Classification: Poster 1