Contribution ID: **290** Type: **Poster**

Magnetic Island Behavior under Non-axisymmetric Halo Current at Vertical Displacement Event

Tuesday, 18 October 2016 08:30 (4 hours)

The non-axisymmetric halo current arising due to loss of plasma vertical equilibrium, the so-called vertical displacement event (VDE), during plasma disruption in vertically elongated tokamak can be one of possible sources of helical magnetic perturbation. This perturbation penetrate into plasma producing magnetic islands in the vicinity of resonant magnetic surface with the same helicity. Results of simulation and analysis of magnetic island production by helical magnetic perturbation generated under non-axisymmetric halo current are presented. Some predictions for ITER-like tokamak are presented with view of the disruption risk analysis. Calculations are carried out with the TEAR code based on the two-fluid MHD approximation. The radial distribution of the magnetic flux perturbation is calculated with account of the external helical field produced by halo current. The equations for the magnetic flux perturbation describe the dynamics of the tearing mode depending on plasma rotation. In sequence, this rotation is affected by electromagnetic forces depending on the tearing mode magnetic field and external magnetic perturbation. Numerically, the diffusion-type equations for the helical flux function and for the plasma rotation velocity are treated in a similar way. The magnetic island behavior is analyzed for different plasma parameters and possible mode numbers. The width of the produced magnetic islands extends to a significant part of plasma minor radius. These magnetic islands can affect plasma stability, equilibrium and confinement, in particular the confinement of runaway electrons, thus affecting the development of the disruption and its impact on tokamak components.

Paper Number

TH/P1-15

Country or International Organization

Russia

Primary author: Dr IVANOV, Nikolay (Kurchatov Institute)

Co-author: Dr KAKURIN, Alexey (Kurchatov Institute)

Presenter: Dr IVANOV, Nikolay (Kurchatov Institute)

Session Classification: Poster 1

Track Classification: THS - Magnetic Confinement Theory and Modelling: Stability