Contribution ID: **561**   Type: **Poster**

Integrated Modelling of ITER Disruption Mitigation

Wednesday 15 October 2014 08:30 (4 hours)

Feasibility of the ITER disruption mitigation system (DMS) to a)mitigate heat loads on the divertor target plates and plasma facing components during the thermal quench (TQ) phase of the disruption; b) reduce electromagnetic forces on the vacuum vessel during current quench; c) avoid or control the runaway electron (RE) generation are studied in the present report. Complex variety of physical phenomena comprising disruption of a tokamak discharge requires integrated modeling approach. The well-validated DINA code [1] is used as an integrating core module for disruption simulator development. Whenever possible the DINA results are verified by ASTRA code [2] simulations. Impurity charge state dynamics, radiation and transport are calculated by the ZIMPUR code [3]. Newly developed gas flow model allows accurate accounting for the technical specifications of MGI system foreseen for ITER DMS. RE generation, evolution and suppression are simulated with use of Monte-Carlo solver for RE kinetic equation integrated with DINA code.

Full disruption scenarios from "prediction" of expected disruption, till complete termination of the plasma current are simulated to determine operation domain for the ITER DMS based on MGI. It is shown that optimization of MGI parameters (geometry, gas mix content and quantities) allows to draw consistent scenario of mitigated disruption with use of two-component MGI system. The first one is aimed on the TQ heat load mitigation, while the second one provides safe plasma current termination without excessive forces on the construction and suppression of REs beams if they appeared.

[1] Khayrutdinov, R.R. and Lukash, V.E., Journal of Computational Physics, 109, (1993) 193.

[2] Pereversev, G.V., Yushmanov, P.N., Preprint IPP 5/98, Garching. Germany (2002).

[3] Leonov, V.M., Zhogolev, V.E., Plasma Phys. Control. Fusion, 47 (2005) 903

Country or International Organisation

Russian Federation

Paper Number

TH/P3-31

Author: Mr KONOVALOV, Sergey (NRC "Kurchatov Institute")

Co-authors: Mr IVANOV, Andrey (Keldysh Institute of Applied Mathematics); Dr HUIJSMANS, Guido (ITER Organization); Mrs ALEYNIKOVA, Ksenia (NRC "Kurchatov Institute"); Dr LEHNEN, Michael (ITER Organization); Dr ALEYNIKOV, Pavel (ITER Organization); Dr KHAYRUTDINOV, Rustam (NRC "Kurchatov Institute"); Dr MEDVEDEV, Sergei (Keldysh Institute of Applied Mathematics); Dr LUKASH, Victor (NRC "Kurchatov Institute"); Dr ZHOGOLEV, Victor (NRC "Kurchatov Institute"); Dr LEONOV, Vladimir (NRC "Kurchatov Institute"); Dr GRIBOV, Yury (ITER Organization)

Presenter: Mr KONOVALOV, Sergey (NRC "Kurchatov Institute")

Session Classification: Poster 3