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Modeling of pre-Thermal Quench and Thermal Quench stages of disruption induced by Massive Gas Injection in ITER

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Modeling of pre-Thermal Quench and Thermal Quench stages
of disruption induced by Massive Gas Injection in ITER

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Abstract

To reduce energy loads on the first wall and divertor during disruption in ITER it is necessary to re-radiate mo
The ASTRA transport code [2] was used for the modeling of the behavior of the bulk plasma parameters and the ZIM
Plasma behavior was examined in the stage preceding the thermal quench, pre-TQ, which starts from the appearanc
Study of the operational space of the ITER DMS system based on a MGI with use of different noble gases and gas mi

- The dependence of the pre-TQ and TQ stages durations on the impurity species and quantities are calculated.
- Assimilation coefficients for the different gases and mixtures are presented. Physical mechanisms hampering impurity penetration into the pre-TQ plasma at MGI are discussed.
- The dependence of the radiated power on injected gas quantity during stages under consideration is presented.
  - The amount of different gases necessary to re-radiate of more than 90% of the energy content of the plasma column in the pre-TQ and TQ stages are estimated.

1 - Leonov, V.M., et al., 38th EPS Conference on Plasma Physics (2011), P2.108
2 - Pereverzev, G.V., Yushmanov, P.N., Preprint IPP 5/98 2002, Garching, Germany
3 - Leonov, V.M., Zhogolev, V.E., Plasma Phys. Control. Fusion 47, 903 (2005)
4 - Zhogolev, V.E., VANT, Nuclear Fusion series, V.37, N 2, 60 (2014) (in Russian)

Eligible for student paper award?

No

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