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Disruptive Heat load Simulation using TSC on EAST

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Tokamak Simulation Code (TSC) is widely used for the simulation of plasma discharge and the design of new physical experiments [1-5]. The code is based on a numerical model of axisymmetric tokamak plasma and associated control system, which simulates the time evolution of two-dimensional time dependent plasma with free boundary by solving the MHD equations on a rectangular computational grid [6]. In this study, TSC is employed to simulate the disruptive discharge of Experimental Advanced Superconducting Tokamak (EAST). Disruption leads to enormous thermal loads on the plasma facing components (PFCs), halo current and electromagnetic force on the conductor parts, and runaway electrons to the PFCs. Heat loads due to the thermal quench (TQ) and runaway electrons cause great damage to PFCs[7,8]. According to transport across large magnetic island, the anomalous transport was adjusted to model the disruption and research the heat load on divertor. The surface temperature of the divertor was measured by the infrared (IR) camera on EAST, and the heat flux on the divertor was calculated based on the IR data. The model results of plasma current, loop voltage, plasma density, heat load on divertor were compared with experimental disruptive data.

References

[1] Y. Nakamura, G. Pautasso, M. Sugihara, et al., 37th EPS Conference on Plasma Physics, P2.184.

[2] I Bandyopadhyay, S M Ahmed, P K Atrey, et al., Plasma Phys. Control. Fusion **46** (2004): 1443-1453.

[3] R.O. SAYER, Y.-K.M. PENG, Nuclear Fusion, Vo1.33, No.7 (1993): 969-978.

[4] N. Takei, Y. Nakamura, H. Tsutsui, 30th EPS Conference on Contr. Fusion and Plasma Phys., St. Petersburg, (2003) Vol. 27A, P-2.127.

[5] LIU Chengyue, XIAO Bingjia, WU Bin, et al., Plasma Science and Technology, Vol.12, No.2 (2010):156-160.

[6] S.C. JARDIN, M.G. BELL, N. POMPHREY, Nuclear Fusion, Vo1.33, No..3 (1993):371-382.

[7] V Riccardo, P Andrew, L C Ingesson, et al., Plasma Phys. Control. Fusion **44** (2002): 905–929.

[8] G. Arnoux, B. Bazylev, M. Lehnen et al., 19th International Conference on Plasma Surface Interactions, San Diego, California, USA (2010)