PLASMA FLOW INTERACTION WITH ITER DIVERTOR RELATED SURFACES

IVAN P. DOJČINOVIĆ
University of Belgrade, Faculty of Physics, POB 44, 11000 Belgrade, Serbia
E-mail: ivbi@ff.bg.ac.rs

Abstract. It has been found that the plasma flow generated by quasistationary plasma accelerators can be used for simulation of high energy plasma interaction with different materials of interest for fusion experiments (Arkhipov et al. 2000, Federici et al. 2005). It is especially important for the studies of the processes such as ELMs (edge localized modes), plasma disruptions and VDEs (vertical displacement events), during which a significant part of the confined hot plasma is lost from the core to the SOL (scrape off layer) enveloping the core region. Experiments using plasma guns have been used to assess erosion from disruptions and ELMs. Namely, in this experiment modification of different targets, like molybdenum, CFC and silicon single crystal surface by the action of hydrogen and nitrogen quasistationary compression plasma flow (CPF) generated by magnetoplasma compressor (MPC) has been studied. MPC plasma flow with standard parameters (1 MJ/m^2 in 0.1 ms) can be used for simulation of transient peak thermal loads during Type I ELMs and disruptions (Dojčinović et al. 2007). Analysis of the targets erosion, brittle destruction, melting processes, and dust formation has been performed (Dojčinović et al. 2006). These surface phenomena are results of specific conditions during CPF interaction with target surface. The investigations are related to the fundamental aspects of high energy plasma flow interaction with different material of interest for fusion. One of the purposes is a study of competition between melting and cleavage of treated solid surface. The other is investigation of plasma interaction with first wall and divertor component materials related to the ITER experiment.

References

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