Contribution ID: **3404** Type: **not specified**

P4.1027 Impact of ICRF and NBI heating on the fast ion distribution function during the plasma termination phase

Thursday, 11 July 2019 14:00 (2 hours)

Seee full abstract here
http://ocs.ciemat.es/EPS2019ABS/pdf/P4.1027.pdf

Reliable and quantitative modelling of the behaviour of fast ions is an essential step in the ITER scenario development because of their important contribution to the plasma energy balance. The fast ion distribution strongly depends on various factors, in particular, on plasma MHD activity and on sources of plasma heating such as neutral beams and RF waves [1, 2]. In our research, we focus on the final stage of a plasma discharge, where the plasma current is ramping down along with a strong reduction in the input power. The main difficulty of modelling and successful experimental performance of this termination phase of a plasma discharge lies in the fast and simultaneous changes of many plasma parameters. Integrated modelling supported by further experimental tests on existing devices will help to inform ITER on robust termination schemes.
Nowadays, tools for integrated modelling are on high demand and under active development. The tokamak transport code TRANSP [3] is used in this work for predictive simulations of equilibrium evolution and transport during the termination phase. The NUBEAM module [4], a Monte Carlo code integrated to TRANSP, provides information on the time-dependent deposition and slowing down of fast ions resulting from neutral beam injection. The interaction between fast ions and RF waves is taken into account through the RF "kick" operator [5]. The effect of low-n MHD instabilities on fast ion transport is then introduced through a reduced model [6]. In the presented research, we will discuss the impact of heating scenarios on the fast ion distribution and how it affects the evolution of other plasma parameters in the plasma termination phase. Correlations between the plasma stability limits, the HL transition, particle and power balances will be considered.

References 1. A. Fasoli, et al, 2007 Nucl. Fusion 47 pp S264S284. 2. V. G. Kiptily et al, 2009 Nucl. Fusion 49 065030. 3. R. J. Hawryluk, 1980 Physics of Plasmas Close to Thermonuclear Conditions 1 pp. 19-46. 4. A. Pankin, D. McCune, R. Andre et al., 2004 Computer Physics Communications 159 pp. 157-184. 5. J.-M. Kwon et al, 2007 Bulletin of the American Physical Society, 49th meeting of the Division of Plasma Physics, Orlando (FL). 6. M. Podestà, et al, 2014 Plasma Phys. Control. Fusion 56 055003.

Presenter: TEPLUKHINA, A.A. (EPS 2019)

Session Classification: Poster P4

Track Classification: MCF