Contribution ID: **139** Type: **Overview Poster**

OV/P-03: On the Physics of Intrinsic Torque in Toroidal Plasmas

Monday, 8 October 2012 14:00 (4h 45m)

Intrinsic rotation is a critical physics issue for ITER, both for resistive wall mode mitigation and for confinement optimization. Rotation control requires predictive understanding of intrinsic rotation, and so this goal has stimulated a great deal of research on intrinsic torque, driven by the non-diffusive fluctuation-induced residual stress[1]. In this OV, we discuss recent theoretical, simulation and experimental progress which elucidates the important physics of intrinsic torque. In contrast to recent OV's on rotation, here we focus on intrinsic torque rather than on the momentum pinch[2]. We present important new results on the critical role of boundary stresses in intrinsic torque. The heat flux-driven character of intrinsic torque is emphasized throughout.
Specifically, we present a novel, unifying theory of intrinsic rotation in terms of fluctuation entropy balance. We then discuss various symmetry breaking mechanisms and their underlying microphysical structure. Applications of the theory to MFE phenomenology are discussed in detail. Novel results on symmetry breaking effects at the boundary, which reveal boundary-specific intrinsic torques, are discussed. We also consider RMP effects on intrinsic rotation.

[1] P.H. Diamond, et al., NF (2009).

[2] A. Peeters, et al., FEC (2010), C. Angioni, et al., H-Mode Workshop (2011).

Country or International Organization of Primary Author

Korea

Primary author: Mr DIAMOND, Patrick H. (Republic of Korea)

Co-authors: Dr MCDEVITT, C.J. (LANL); Dr CHANG, C.S. (PPPL); Dr DIF-PRADALIER, G. (CEA); Dr JHANG, H. (NFRI); Dr ABITEBOUL, J. (CEA); Dr RICE, J. (MIT); Dr KWON, J.M. (NFRI); Dr IDA, K. (NIFS); Dr FEDORCZAK, N. (UCSD); Dr SINGH, R. (ITER, IPR); Dr KU, S. (PPPL); Dr YI, S. (NFRI); Dr KIM, S.S. (NFRI); Dr RHEE, T. (NFRI); Prof. HAHM, T.S. (SNU); Dr SOLOMON, W. (PPPL); Dr WANG, W. (PPPL); Mr KOSUGA, Y. (UCSD); Dr SARAZIN, Y. (CEA); Dr GÜRCAN, Ö.D. (L.P.P. Ecole Polytechnique)

Presenter: Mr DIAMOND, Patrick H. (Republic of Korea)

Session Classification: Overview Posters

Track Classification: OV - Overviews