DTU Library

Radial transport of poloidal momentum in ASDEX Upgrade in L-mode and H-mode

Schrittwieser, R.; Mehlmann, F.; Naulin, Volker; Juul Rasmussen, Jens; Müller, H.W.; Ionita, C.; Nielsen, Anders Henry; Vianello, N.; Rohde, V.

Publication date:
2012

Citation (APA):
Schrittwieser, R., Mehlmann, F., Naulin, V., Juul Rasmussen, J., Müller, H. W., Ionita, C., Nielsen, A. H., Vianello, N., & Rohde, V. (2012). *Radial transport of poloidal momentum in ASDEX Upgrade in L-mode and H-mode*. Abstract from Workshop on Electric Fields, Turbulence and Self Organization in Magnetized Plasmas (EFTSOMP 2012), Stockholm, Sweden.

Radial transport of poloidal momentum in ASDEX Upgrade in L-mode and H-mode

R. Schrittwieser[1], F. Mehlmann[1], V. Naulin[2], J.J. Rasmussen[2], H.W. Müller[3], C. Ionita[1], A.H. Nielsen[2], N. Vianello[4], V. Rohde[3], ASDEX Upgrade Team[3]

[1]*Inst. Ion Phys. & Appl. Physics, EURATOM-ÖAW Association, University Innsbruck, Austria*

[2]*Association EURATOM – DTU, Technical University of Denmark, Department of Physics, DTU Risø Campus, Roskilde, Denmark*

[3]*Max-Planck-Institute for Plasma Physics, EURATOM Association, Garching, Germany*

[4]*Consorzio RFX, Associazione Euratom-ENEA sulla Fusione, Padova, Italy*

Turbulent transport and related parameters were investigated in the SOL of ASDEX Upgrade (AUG) in L-mode and H-mode discharges. The probe head [1] carries six probe pins of 1 mm diameter and 2 mm length. One pin is radially protruding by 3 mm. With this array the poloidal and radial electric field components $E_{\theta,r}$, respectively, and the ion density n could be determined simultaneously. From these data in particular the radial flux of poloidal momentum, $M_r = nv_rv_\theta = nE_\theta E_r \big/ B_\phi^2$, was derived (B_ϕ is the toroidal magnetic field). The density n and the radial and poloidal velocity components, $v_{r,\theta}$, respectively, are defined as $X = X_0 + X_{\rm fl}$ (i.e. the stationary and the fluctuating components). Thereby the radial flux of poloidal momentum splits into various contributions [2,3] of which three are of interest to us: (i) Reynolds stress $\mathcal{Re} = n_0 v_{r,\rm fl}\, v_{\theta,\rm fl}$, (ii) convective momentum flux term $v_{\theta,0}\Gamma = v_{\theta,0} n_{\rm fl} v_{r,\rm fl}$ and (iii) triple fluctuating term $n_{\rm fl}\, v_{r,\rm fl}\, v_{\theta,\rm fl}$. Here we discuss the probability density functions (PDF) of these quantities, normalized to their standard deviations, for L-mode shot #23157 during its diverted phase and H-mode shot #23163. In case of H-mode discharges, M_r is calculated separately for ELM-intervals and inter-ELM intervals, i.e., in between type-I ELMs. Whereas in H-mode due to neutral beam injection (NBI) there is an external source for toroidal angular momentum, in the L-mode discharge there is only intrinsic rotation. In both cases we see radial flux of poloidal momentum but with opposite signs.

References

[1] C. Ionita, N. Vianello, H.W. Müller, et al., J. Plasma Fusion Res. Series 8, 413 (2009).

[2] F. Mehlmann, C. Ionita, V. Naulin, et al., 37th EPS Conf. Plasma Phys. (Dublin, 2010), P1.1064.

[3] J. R. Myra, D. A. Russell, D.A. D'Ippolito, Phys. Plasmas 15, 032304 (2008).