Poloidal Asymmetries in the ISTTOK Edge Plasma

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Transport in the edge plasma of tokamaks is often viewed as a one-dimensional, radial diffusive process, with diffusion caused mainly by turbulence. Observations from a large number of tokamak experiments suggest, however, that such a view of the edge transport is incomplete and that poloidal asymmetries play an important role in the edge plasma (see, e.g. [1]).

Four multi-pin probe systems have been installed at different poloidal positions in the tokamak ISTTOK edge plasma: (i) $\theta = 0^{o}$, Low Field Side (LFS); (ii) $\theta = 90^{o}$, top; (iii) $\theta = 180^{o}$, High Field Side (HFS); and (iv) $\theta = 270^{o}$, bottom. The probe systems permit the simultaneous determination of several plasma parameters including: floating potential, ion saturation current, turbulent particle flux, parallel flow and poloidal electric field. The properties of the fluctuations associated with these quantities can also be investigated as signals are recorded at 2 MHz. Such a probe system allows a comprehensive characterization of the edge plasma properties and the study of the poloidal asymmetries.

The edge plasma density and turbulent particle flux are found to be larger at the LFS for both toroidal magnetic field directions, suggesting a poloidally asymmetric transport. The statistical properties of the turbulence support this interpretation as they are found to be more intermittent on the outboard side. Results indicate therefore that the constant pressure surfaces are not coincident with the constant magnetic flux surfaces. Strong poloidal asymmetries are also observed in the parallel flow, which is negative (relative to the B_T direction) at the HFS and positive in the other locations. Furthermore, large poloidal electric fields are identified, suggesting the existence of convective cells that can significantly modify the radial particle transport.

[1] B. LaBombard, B. Lipschultz, *Nucl. Fusion* **27** (1987) 81