1.1 - Project name

Tokamak ISTTOK

1.2 - Project team

Please fill the table below with the team data. Add more rows if required.

Name	Degree	% participation
Rui Barrocas Gomes	Doctorate researcher	100 %

1.3 - Summary and highlights of research achievementes

Provide a concise description of the main research achievements during the year.

Figures, tables, graphics etc must have captions.

Graphic files must be submitted separately from the text (i.e. not embedded), and have a resolution of at least 150 dpi.

1.3.1 Introduction

This Project has included activities in the areas of:

- Study of fusion relevant materials;
- Real time control and data acquisition;
- Diagnostics;
- Plasma physics studies.

1.3.2 Study of fusion relevant materials

1.3.3 Real time control and data acquisition

1.3.4 Diagnostics

1.3.5 Plasma physics studies

Interaction between mean and fluctuating ExB shear flows on the ISTTOK edge plasma

The interplay between mean and fluctuating ExB shear flows has been investigated in the ISTTOK edge plasma. The GAM shearing rate was found to be lower (by a factor of 2 - 3) than that of the mean flow but comparable to the turbulent decorrelation rate, suggesting that both the time-varying flow and mean flow are important to stabilize turbulence. The externalplasma biasing was found to modify the GAM amplitude particularly for negative bias where the fluctuations are strongly reduced and consequently GAMs are suppressed. For positive bias a small reduction of the GAM amplitude is observed in spite of the increase in the long-range correlation. The increase in the long-range correlationfor positive bias might be

interpreted as an enhanced energy transfer from the turbulence into large scale, low frequency structures associated with modest increase in the mean shear flow induced.

Comparison between the edge plasma fluctuations at the low and high field side in the ISTTOK edge plasma

Edge plasma asymmetries have been further investigated on ISTTOK with a probe system that simultaneously samples the plasma on four poloidal angles with emphasys of the edge fluctuations properties. The larger cross-field particle transport observed at the LFS for both B_T and I_p directions was found to be consistent with the fluctuations characteristics. Fluctuations at the outboard are more intermittent as demonstrated by the high fluctuation level and skewness at this location. The frequency resolved turbulent particle flux also shows differences between the inboard and outboard midplane. The contribution of the low frequency range (f < 50 kHz) dominates the turbulent flux at the HFS, contrary to the observed at the LFS where a significant transport is observed for frequencies up to 150 kHz. ISTTOK results clearly demonstrate that the turbulence drive is ballooning-like leading to a poloidally asymmetric transport.

Study of the Zonal Flow influence on the local turbulent transport in the ISTTOK edge plasma.

The cross-field turbulent particle transport has been estimated using probe data. To better understand the effect of ZFs on transport, the frequency resolved coherence, cross-phase between I_{sat} and V_f fluctuations and turbulent particle flux measured at two radial location, edge plasma (r/a ~ 0.89) and SOL (r/a ~ 1.05), have been compared. A smaller coherence between I_{sat} and V_f fluctuations was found at the edge plasma for low frequencies (< 30 kHz). Furthermore, in the edge plasma both the phase between I_{sat} and V_f fluctuations and the poloidal wavenumber are close to zero for frequencies below 30 kHz, implying that the cross-field turbulent transport is modest in the frequencies range where ZFs dominate. On the contrary, transport in the SOL is dominated by frequencies below 50 kHz as the coherence between I_{sat} and V_f fluctuations is higher and their phase difference around 90º in this frequency range. Results suggest therefore that ZFs may influence the local turbulent particle transport. Furthermore, the turbulent transport at low frequencies is cancelled as large scale potential fluctuations have symmetric characteristics.