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EVIDENCE OF TRANSPORT BARRIER IN TOKAMAK DISCHARGE WITH HIGH MHD ACTIVITY

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1. INTRODUCTION

We analyze the transport of particles in the plasma edge of TCABR tokamak caused by the plasma turbulence [1, 2]. This transport depends on the high MHD activity and is modified by altering the plasma flow velocity due to the toroidal magnetic field and the radial electric field. In this work, we report evidence of a transport barrier in the radial position with a shearless in the drift flow velocity radial profile.

2. EXPERIMENTAL RESULTS

The experimental results presented in this work, on the relation between drift and phase velocities and transport barrier support the model presented in [3, 4]. In this model there is a function, the so called Confinement Profile [U(r)], proportional to the difference between the one dominant wave phase velocity and the drift flow velocity, that determines the chaotic particle transport in the radial direction.

The reported dependence can be recognized in Fig.1 that shows the radial profiles of the experimental particle transport, measured in several radial positions (green cicles), and the phase and drift flow velocity difference. Moreover, we present in Fig.2 the experimental Confinement Profile (black full line) and the profiles of the wave and drift velocities. These two figures shows a transport decay in the region where the Confinement Profile has a local maximum, corresponding to a shearless point. This decay indicates a possible transport barrier at this position, as predicted in [3, 4].

3. CONCLUSION

Analysing TCABR plasma discharges with high MHD activity, we found evidence that the transport decreased where the phase and drift velocities are about the same. This indicates a transport barrier created in the radial position where a dominant resonant wave has a phase velocity equal to the local plasma flow drift velocity.

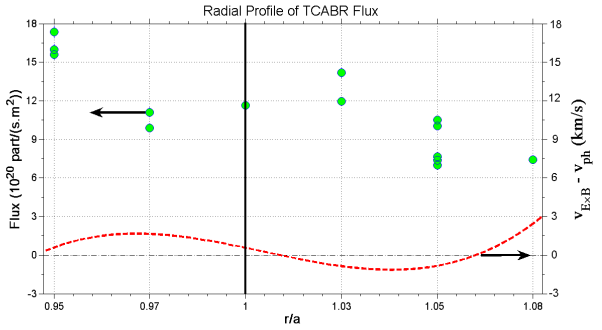

Figure 1 – TCABR particle flux radial profile (green cicles). The red full line represents the difference between the phase and flow velocities.

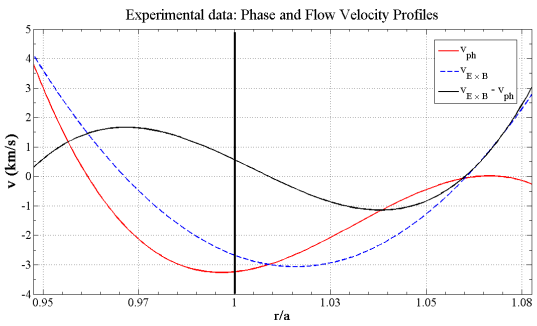

Figure 2 – TCABR Experimental Confinement Profile at the plasma edge (black full line) proportional to the difference between phase (red full line) and flow (blue dashed line) velocity profiles

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