Edge effects of dynamically shaped tokamak configuration in RFX-mod experiment


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The RFX-mod experiment is a fusion oriented device mainly designed as Reversed Field Pinch, with a major radius R= 2 m, and minor radius a = 0.459 m, with a first wall fully covered by graphite tiles. The high versatility of the device allows now to operate the machine also as a Tokamak, in such a way that a switch from one magnetic configuration to the other one can be rather easily provided and allows the unique possibility of comparing two different configurations, namely the reversed field pinch and the tokamak, in the same device. The new magnetic configuration obtained is basically a circular ohmic tokamak, but recently the dynamical control of the plasma column shift and ellipticity become available within a single discharge.

Aim of this contribution is to provide a characterization of the edge region in this new operation mode in term of average profiles of flow, parallel and perpendicular to the local average magnetic field, local measurements of density, temperature and their fluctuations, and beyond standard electrostatic parameter also direct measurement of parallel vorticity and parallel current density fluctuation features are evaluated. From the electromagnetic fluctuations point of view also the radial profiles of Reynolds and Maxwell stresses can be investigated. The diagnostic set is complemented by electrostatic and magnetic sensors distributed on the first wall and capable of monitoring the very edge plasma.

Measurements are performed by inserting, up to r/a = 0.91, probe heads combining electrostatic and magnetic measurements. The different probe insertion and the modulation of LCFS position, by active control of the plasma shift and ellipticity, will be combined in order to explore the SOL region and the position of the LCFS.

Different plasma equilibria are explored and in particular q(a) ranging from 2 to 3 were achieved within the same discharge. Comparison with previous edge measurements obtained in RFX-mod in RFP configuration will be carried out.