

Electromagnetic vortex structures in the edge region of a fusion-relevant plasma

M. Spolaore, N. Vianello, M. Agostini, V. Antoni, R. Cavazzana, E. Martines, P. Scarin, G. Serianni, E. Spada, M. Zuin

Consorzio RFX, Associazione Euratom-ENEA sulla Fusione, Corso Stati Uniti 4, 35127 Padova, Italy

We present a detailed analysis of electrostatic and magnetic fluctuations obtained with an insertable probe, equipped with both electrostatic and magnetic sensors, and with a Gas Puffing Imaging (GPI) diagnostic in the edge region of RFX-mod. Using the multi-point measurements given by the probe, quantities such as current density and vorticity fluctuations have been derived. The data have been analyzed selecting structures at a given scale through the wavelet transform technique, and performing a conditional average of the individual structures. As a result, it has been found that blobs of electron pressure are associated to a plasma potential perturbation, which gives rise to a parallel vorticity peak describing the occurrence of a vortex-like plasma motion in the perpendicular plane. Furthermore, a field-aligned current filament is associated to the blob, revealing the electromagnetic nature of the observed phenomenon. The vortex-like fluid motion is found to take place at a speed equal to the Alfvén velocity. All these elements point to an interpretation of the observed structures as drift-Alfvén vortices, similar to those observed in the magnetosphere.