ID de Contribution: **28** Type: **Oral presentation**

Low frequency waves in a magnetically confined plasma column

vendredi 29 novembre 2019 17:10 (20 minutes)

Low frequency waves turbulence developing in magnetized plasma columns are well known to trigger important radial transport, a major issue for fusion devices. We present here analysis from very fast imaging of low frequency waves in a magnetically confined plasma column.

Our experimental set-up consists in a cylindrical chamber containing an Argon plasma column of 10 cm diameter of ionization rate 20 % and at low pressure ~ 1 mTorr generated via an electromagnetic induction source of power 1 kW. The plasma is confined by a magnetic field ranging from 0.01 T to 0.15 T.

A very fast camera records images of spontaneous radiated light fluctuations in a plane transverse to the plasma column axis, at a 200 kfps rate, showing the presence of azimuthally rotating waves at frequencies of order the kHz. These images are analysed using a Proper Orthogonal Decomposition technique which is compared to 2D axisymmetric Fourier transform analysis. The POD results exhibit m-modes closely following the exp(i m \theta) spatial form of the modes extracted by 2D Fourier transform.

Finally, the impact of an emissive cathode inserted at the center of the plasma column on the waves properties is investigated.

Field

Plasma

Language

English

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Classification de Session: Oral presentations session

Classification de thématique: Physics