

## Drift Wave Antenna Excitation in TORPEX Low-field Side

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Low frequency electrostatic fluctuations are ubiquitous in laboratory plasmas and play an important role in anomalous cross-field transport. Understanding this role is of great importance in magnetically confined plasmas. One approach to investigate the underlying physics and the possibility of influencing transport can be performed using array antennas to couple to naturally occurring modes of the plasma. Recent experiments have shown modes coupling at the expenses of a broadband spectrum of fluctuations in a linearly magnetized device, and have demonstrated nonlinear coupling with drift waves [1].

In this contribution, the linear excitation of modes in the drift wave frequency range using a tunable antenna in a simple magnetized torus is demonstrated. The experiments are performed on a magnetized plasma produced in Hydrogen using microwaves and contained in the toroidal device TORPEX (major radius 1 m, minor radius 20 cm). The antenna consists of four electrodes ( $d_1 \times d_2$ ,  $d_1 = 30$  mm along  $B_\phi$ ,  $d_2 = 8$  mm along  $B_z$ , and thickness 0.9 mm) immersed in the plasma and lying in the vertical direction. Each electrode is driven in the drift wave frequency range with a sinusoidal potential. Adjusting the relative phase between adjacent electrodes provides control of the vertical wave number. Using a coherent detection technique and Langmuir probes the density response induced by the antenna excitation is measured across the plasma cross-section. A reconstruction of this response in the plasma frame shows multiple peaks. Comparison of the measured response with theoretical predictions from the Hasegawa-Wakatani model, computed on the basis of the launched antenna k-spectrum and measured wave vector, shows agreement for the one peak (resonant) corresponding to a drift wave mode [2]. The non-resonant peaks remain unexplained with the current linear model. The linear scaling of the resonant peak amplitude with the potential applied to the antenna corroborates the linear excitation of the drift mode. Finally, nonlinear wave-wave interactions involving the mode driven by the antenna is explored. Results of the antenna-driven response as a function of the ratio of magnetic connection length and electron mean free path will be presented. Status of the LIF and other diagnostics in TORPEX will be discussed.

[1] C. Schröder *et al*, Phys. Rev. Lett. **86**, 5711 (2001)

[2] A. Diallo *et al*, *Submitted to Phys. Plasmas*