

Abstract Submitted  
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**Coherent multi-harmonic structures in an inhomogeneous current-free plasma**<sup>1</sup> SU-HYUN KIM, ROBERT MERLINO, University of Iowa — High resolution observations with the FAST satellite in the upward current auroral region have revealed discreet electrostatic harmonic features at multiples of the proton gyrofrequency. The time series of the parallel electric field showed characteristic spiky waveform structures separated by the ion gyroperiod. These structures were associated with shear in the ion drift along the magnetic field. We have conducted laboratory experiments in a Q machine investigating the effects of ion flow shear on the excitation of EIC waves in a current-free plasma. A broadband white noise signal was applied to an antenna in the plasma which launched electrostatic waves into a region containing parallel velocity shear. Measurements of the wave amplitude in the shear region showed a discreet spectrum with multiharmonic features near the ion cyclotron frequency and several harmonics. These features were only observed when ion flow shear was present. The time series of these oscillations showed spiky features separated in time by the cyclotron period. These spiky structures appear to be due to a linear superposition of many phase-locked cyclotron harmonics.

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