Abstract Submitted
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Nonlinear Trivelpiece-Gould Waves: Frequency, Functional Form, and Stability[1] DANIEL H.E. DUBIN, University of California San Diego — This poster considers the frequency, spatial form, and stability, of nonlinear Trivelpiece- Gould (TG) waves on a cylindrical plasma column of length L and radius r_p, treating both traveling and standing waves, and focussing on the regime of experimental interest in which $L/r_p \gg 1$. In this regime TG waves are weakly dispersive, allowing strong mode-coupling between Fourier harmonics. The mode coupling implies that linear theory for such waves is a poor approximation even at fairly small amplitudes, and nonlinear theories that include only a small number of harmonics (such as 3-wave parametric resonance theory) fail to fully capture the stability properties of the system. We find that nonlinear standing waves suffer jumps in their functional form as their amplitude is varied continuously. The jumps are caused by nonlinear resonances between the standing wave and nearly linear waves whose frequencies and wave numbers are harmonics of the standing wave. Also, the standing waves are found to be unstable to a multi-wave version of 3-wave parametric resonance, with an amplitude required for instability onset that is much larger than expected from three wave theory. For traveling wave, linearly *stability* is found for all amplitudes that could be studied, in contradiction to 3-wave theory.

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Daniel H. E. Dubin
University of California San Diego

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