Abstract Submitted
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Evidence of a New Instability in Gyrokinetic Simulations of LAPD Plasmas[1] P.W. TERRY, M.J. PUESCHEL, University of Wisconsin-Madison, G. ROSSI, F. JENKO, D. TOLD, T.A. CARTER, University of California at Los Angeles — Recent experiments at the LArge Plasma Device (LAPD) have focused on structure formation driven by density and temperature gradients. A central difference relative to typical, tokamak-like plasmas stems from the linear geometry and absence of background magnetic shear. At sufficiently high β, strong excitation of parallel (compressional) magnetic fluctuations was observed. Here, linear and nonlinear simulations with the GENE code are used to demonstrate that these findings can be explained through the linear excitation of a Gradient-driven Drift Coupling mode (GDC). This recently-discovered instability, unlike other drift waves, relies on the grad-B drift due to parallel magnetic fluctuations in lieu of a parallel electron response, and can be driven by density or temperature gradients [M.J. Pueschel et al., Phys. Plasmas 22, 062105 (2015)]. The linear properties of the GDC for LAPD parameters are studied in detail, and the corresponding turbulence is investigated. It is found that, despite the very large collisionality in the experiment, many properties are recovered fairly well in the simulations. In addition to confirming the existence of the GDC, this opens up interesting questions regarding GDC activity in astrophysical and space plasmas.

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