

Abstract Submitted
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Particle-in-Cell Simulations of Two-dimensional Electrostatic Structures¹ C.S. NG, S.J. SOUNDARARAJAN, E. YASIN, Geophysical Institute, University of Alaska Fairbanks — Electrostatic structures have been observed in many regions of space plasmas, including the solar wind, the magnetosphere, the auroral acceleration region. One possible theoretical description of some of these structures is the concept of Bernstein-Greene-Kruskal (BGK) modes, which are exact nonlinear steady-state solutions of the Vlasov-Poisson system of equations in collisionless kinetic theory. Recently we have constructed exact solutions of two-dimensional (2D) BGK modes in a magnetized plasma with finite magnetic field strength in order to gain insights of the ultimate 3D theory [Ng, Bhattacharjee, and Skiff, *Phys. Plasmas* 13, 055903 (2006)]. Based on the analytic form of these solutions, we have performed Particle-in-Cell (PIC) simulations to study their stability. We have also simulated more general initial conditions, and found that while these are not steady-state solutions, they still keep their overall structures with modulations having frequency of the order of electron cyclotron frequency.

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