Two-Dimensional Current Carrying Bernstein-Greene-Kruskal (BGK) Modes for the Vlasov-Poisson-Ampere System[1] C.S. NG, 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. We generalize exact solutions of two-dimensional BGK modes in a magnetized plasma with finite magnetic field strength [Ng, Bhattacharjee, and Skiff, Phys. Plasmas 13, 055903 (2006)] to cases with azimuthal magnetic fields so that these structures carry electric current as well as steady electric and magnetic fields. Such nonlinear solutions now satisfy exactly the Vlasov-Poisson-Ampere system of equations.

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