

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Kinetic Flux Rope Solutions with both Electron and Ion Effects¹

C. S. NG, H. TANG, University of Alaska Fairbanks — Exact nonlinear solutions of the Vlasov-Poisson- Ampère system of equations, known as two-dimensional Bernstein-Greene-Kruskal (BGK) modes, and having magnetic field structures in the form of small-scale kinetic flux ropes were found previously under the assumption of a uniform ion density [Ng, Phys. Plasmas **27**, 022301 (2020)]. In this work, we generalize the theory by including distribution functions for both electrons and ions. New calculations using both electrons and ions distributions with finite electron/ion temperature ratios show that solutions generally exist, including realistic temperature ratios commonly observed in space plasmas. We construct solutions with kinetic effects coming from electrons, or ions, or both, with either positive or negative electric potential, demonstrating a large range of possibilities for kinetic flux rope solutions.

¹This work is partially supported by a National Science Foundation grant.

Chung-Sang Ng
University of Alaska Fairbanks

Date submitted: 29 Jun 2020

Electronic form version 1.4