

EGU21-6599

<https://doi.org/10.5194/egusphere-egu21-6599>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Farley Buneman instabilities in the Auroral region: Continuous kinetic and hybrid simulations.

Enrique Rojas and David Hysell

Cornell University

Farley-Buneman instabilities generate a spectrum of field-aligned plasma density irregularities in the E region. Although fully kinetic particle-in-cell simulations offer a comprehensive description of the underlying physics, its computational cost for studying non-local phenomena is tremendous. New methods based on hybrid and continuous approaches have to be explored to capture non-local physics.

In this work, we present new developments on a continuous solver of Farley-Buneman waves. We compare the performance of fully kinetic (continuous), hybrid, and fluid models. Furthermore, we investigate phase speed saturation, wave turning effects, and dominant wavelengths and assess how well these correspond to radar measurements. Finally, we describe some initial attempts at constructing simple surrogate models to capture the dominant microphysics of these simulations.