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Vlasov Simulations of Ionospheric Turbulence near the Upper Hybrid Layer AMIR NAJMI, Univ of Maryland-College Park, BENGT ELIASSON, University of Strathclyde, XI SHAO, GENNADY MILIKH, SURJA SHARMA, KONSTANTINOS PAPADOPOULOS, Univ of Maryland-College Park
— High-frequency, ordinary (O) mode electromagnetic waves incident on a magnetized plasma near the upper hybrid resonance can excite magnetic field aligned density striations, associated with both turbulence and electron heating. We have used Vlasov simulations, which combine low noise and high resolution of all areas of phase space, in one spatial and two velocity dimensions to study the induced turbulence in the presence of striations near the upper hybrid resonance, where the O-mode pump is mode converted to large amplitude upper hybrid oscillations trapped in a striation. By taking moments of the resulting electron and ion distribution functions, we were able to correlate the evolution of stationary electron and ion oscillations with the onset of turbulence, and the heating of electrons in the striation with large amplitude, short wavelength electron Bernstein waves. These Bernstein waves excite stochastic electron heating when the normalized gradients of their electric field exceed the electron gyroradius, breaking the drift approximation, and causing particle orbits in phase space to diverge exponentially, rapidly increasing the electron temperature by several thousand Kelvin. These results are relevant to ongoing high-latitude heating experiments.

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