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Understanding Electron-Scale Electric Field Fluctuations in Solar wind Kinetic Turbulence: Artemis Observations

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We present here an analysis of kinetic-scale electromagnetic fluctuations in the solar wind up to electron scales based on data analysis from the THEMIS/ARTEMIS spacecraft. We focus on an interval characterized by a plasma beta of 2 and analyze magnetic, electric field, and density fluctuations from the 0.01 Hz (well in the inertial range) up to 1 kHz. We compute parameters such as the electric to magnetic field ratio, the magnetic compressibility, magnetic helicity, compressibility and other relevant quantities in order to diagnose the nature of the fluctuations at those scales between the ion and electron cyclotron frequencies, extracting information on the dominant modes composing the fluctuations. We also use the linear Vlasov-Maxwell solver, PLUME, to determine the various relevant modes of the plasma with parameters from the observed solar wind intervals. We discuss the results and the relevant modes as well as the major differences between our results in the solar wind and results in the magnetosheath.