Magnetohydrodynamic Turbulence in the Frequency Domain
VLADIMIR ZHDANKIN, STANISLAV BOLDYREV, University of Wisconsin-Madison, JEAN CARLOS PEREZ, University of New Hampshire - Space Science Center, QIAN XIA, University of Wisconsin-Madison — We investigate the fluctuations of magnetohydrodynamic (MHD) turbulence in the temporal dimension, in contrast to the more commonly considered spatial dimensions. Such an analysis may be relevant for observations of turbulence in the Earth's magnetotail, where Taylor's hypothesis does not apply. We consider the two-dimensional (wavevector-frequency) energy spectrum, $E(k_\perp, \omega)$, and assess the anisotropy of fluctuations by studying the scaling of the energy-containing region. We find that the form of $E(k_\perp, \omega)$ is strongly indicative of sweeping by the large-scale velocity field. We attempt to remove the effects of sweeping to obtain the local anisotropy, which can be used to test the predictions of critical balance.

Vladimir Zhdankin
University of Wisconsin-Madison