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Quantifying Properties of Collisionless Turbulence Through Wavelet Analysis HOMA KARIMABADI, UCSD, KAI SCHNEIDER, 2M2P2-CNRS and Aix Marseille University, Marseille, France, VADIM ROYTERSHTEYN, SciberQuest, Inc., WILLIAM DAUGHTON, Los Alamos National Laboratory, BURLEN LORING, Lawrence Berkeley National Laboratory, Berkeley CA — Recent advances in fully kinetic simulations are enabling us to conduct simulations of collisionless turbulence that span the scales from MHD down to electron kinetic scales. One of our key findings is that the cascade process in collisionless plasma turbulence leads to generation of coherent structures in the form of kinetic scale current sheets. These current sheets are in turn found to play an important role in the dissipation of the cascading energy. Wavelets are ideally suited for characterizing localized multi-scale structures and have been successfully used in studies of fluid turbulence. Here we apply wavelets in characterizing four important properties of turbulence: (a) its spectral features such as scale dependent statistics and their spatial fluctuations, (b) extraction of coherent structures using thresholding of the wavelet coefficients, (c) quantification of dissipation scales, and (d) compressibility of the fluctuations. Comparisons with Fourier techniques are also made.

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