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Fast Mode Turbulence in Low-Beta Plasmas with Applications to Solar Wind[1] HUI LI, LANL, VLADIMIR SVIDZINSKI, MATT BUONI, SHENG-TAI LI, HUSSEIN ALUIE — We study the fast mode turbulence in low-beta compressible plasmas with applications to the solar wind magnetic fluctuations and particle heating. We have performed both 2-D compressible MHD simulations and the full electromagnetic particle-in-cell simulations to examine the nonlinear evolution of an initial set of fast modes with long wavelengths. In the MHD regime, these waves produce a cascade to smaller scales, showing a faster cascade in the direction perpendicular to the initial magnetic field than in parallel. A small amount of slow modes are excited and shock damping is the predominant dissipation mechanism of magnetic fluctuations. As the fast modes enter the kinetic regime, the cascade continues to well beyond the ion cyclotron frequency. At the high frequency regime, the cascade exhibits strong anisotropy, with more power in the direction perpendicular to the initial magnetic field. Most of the fluctuation energy still remains in the fast wave oscillations. Collisionless damping on electrons is the main dissipation channel in damping the high frequency fast modes. Comparison with solar wind observations will be discussed.

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