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Tests of Nonlinear Interactions Between Alfvén Waves Using Gyrokinetic Simulation KEVIN NIELSON, GREGORY HOWES, University of Iowa — Nonlinear interactions between Alfvén waves are the fundamental action responsible for plasma turbulence, governing energy transport across a wide range of scales and in nearly any plasma environment. MHD theory predicts that turbulent transport in magnetized plasmas occurs as the result of nonlinear interactions between Alfvén waves propagating oppositely along the mean magnetic field. This theory suggests a mechanism for these interactions and predicts interaction rates and products. These results from MHD theory have influenced the development of Alfvénic turbulence theory, but the MHD approximation does not hold in many plasmas of scientific interest, making it difficult to test the theory by experiment. We present results of a study employing gyrokinetic simulations that test the hypotheses of MHD Alfvénic turbulence theory. These simulations, performed with the astrophysical gyrokinetics code AstroGK, enable the construction of MHD approximating conditions without relying explicitly on the assumptions of MHD theory.

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