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Gyrokinetic Study of Nonlinearly Interacting Pairs of Alfvén Waves KEVIN NIELSON, GREGORY HOWES, University of Iowa — Gyrokinetic simulations of Alfvén waves play a primary role in turbulent energy transport in magnetized plasmas. MHD theory predicts that the transfer of energy from large to small scales results only from "collisions" between Alfvén waves propagating oppositely along the mean magnetic field. Within MHD theory, simple predictions can be made about the rate of energy transfer versus amplitude, scale, and wave polarization. Physical plasmas, however, particularly those found in the solar wind, are not always well described by MHD theory. There are, therefore, more complicated effects that may be expected, arising from compressibility and kinetic effects, such as the dispersion of shear Alfvén waves. In this work, we model simple systems consisting of individual collisions between pairs of parent Alfvén wave modes. By comparing the MHD prediction in the weak interaction limit to simulations performed with the gyrokinetics code `AstroGK`, we are able to examine the limits of validity of the MHD theory of nonlinear interaction and the nature of nonlinear interactions in regions outside this simple limit.

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