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Dispersive magnetized waves in the solar wind plasma[1] DASTGEER SHAIKH, Department of Physics and Center for Space Plasma and Aeronomic Research (CSPAR), University of Alabama at Huntsville, Huntsville, AL 35805, B. DASGUPTA, Center for Space Physics and Aeronomic Research (CSPAR), University of Alabama at Huntsville, Huntsville, AL 35805, P.K. SHUKLA, Institut fur Theoretische Physik IV, Fakultat fur Physik und Astronomie, Ruhr-Universitat Bochum, D-44780 Bochum, Germany — We derive a generalized linear dispersion relation of waves in a strongly magnetized, compressible, homogeneous and isotropic quasi-neutral plasma. Starting from a two-fluid model, describing distinguishable electron and ion fluids, we obtain a six-order linear dispersion relation of magnetized waves that contains effects due to electron and ion inertia, finite plasma beta and angular dependence of phase speed. We investigate propagation characteristics of these magnetized waves in a regime where scale lengths are comparable with electron and ion inertial length scales. This regime corresponds essentially to the solar wind plasma, where length scales, comparable with ion cyclotron frequency, lead to dispersive effects. These scales in conjunction with linear waves present a great deal of challenges in understanding the high-frequency, small-scale dynamics of turbulent fluctuations in the solar wind plasma.

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