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Whistler emissions from nonlinear EMHD fields[1] J.M. URRUTIA, R.L. STENZEL, K.D. STROHMAEIR, Physics and Astronomy, UCLA — Time-varying magnetic fields comparable to the ambient dc magnetic field are produced in the parameter regime of electron MHD (EMHD) in a large laboratory plasma. These are excited with magnetic loop antennas driven by a large low frequency ac current ($f = 200$ kHz $\ll f_{ce} = 14$ MHz $\ll f_{pe} = 4$ GHz). Weak whistler emissions are observed from current layers which may coincide with magnetic null lines. The waves are transient and propagate generally oblique to the total magnetic field which is nonuniform and time-varying. The waves can be produced by whistler instabilities due to temperature anisotropies or currents. Magnetic null lines are frequently sources of whistler emissions, but cross-field currents have also been identified as producing transient waves. When the loop antenna axis is parallel to the ambient field, the EMHD field itself propagates and becomes a moving wave source. The topology of fields and waves requires 3D measurements to unravel when the loop antenna axis is orthogonal to B_0. A strong antenna field can magnetize the electrons even in the absence of the ambient field and support locally produced whistler emissions.

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