

Abstract Submitted
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Ion acceleration in Hall electric fields¹ K.D. STROHMAIER, R.L. STENZEL, J.M. URRUTIA, Physics & Astronomy, UCLA — Time-dependent magnetic fields are applied to a large laboratory plasma operating in the regime of electron magnetohydrodynamics (EMHD; magnetized electrons, unmagnetized but mobile ions). The fields are produced by pulsing currents through insulated magnetic loop antennas whose dipole axis is parallel or antiparallel to the uniform dc magnetic field. The magnetic $\mathbf{J} \times \mathbf{B}$ force on the electrons produces a space charge (Hall) electric field normal to the antenna coil. The unmagnetized ions are accelerated away leaving a density depletion around the coil. When the coil current is switched off, the induced image current flows outside the plasma void at a larger radius than the coil. Asymmetries in the ion expulsion may lead to the frequently observed asymmetries in the current rings. The current layer also produces strong electron heating. Thus, magnetic energy is transferred to both ions and electrons.

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