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Gendrin mode vortices and helicons in unbounded plasmas[1] J. MANUEL URRUTIA, REINER STENZEL, Dept of Physics and Astronomy, UCLA — Magnetic loop antennas are used to excite cw whistler modes in a large laboratory plasma for parameters $\omega \simeq 0.3\omega_{ce} \ll \omega_{pe}$. The wave topology and propagation is measured in 3D space and time with magnetic probes. When the antenna dipole field is aligned with the uniform background field $\mathbf{B_0}$, the spatial wave packets have conical phase fronts and linked toroidal and poloidal fields. These whistler "vortices" resemble $m = 0$ helicons in bounded plasmas. The topology resembles that of $m = 1$ helicon modes when the antenna dipole field is perpendicular to $\mathbf{B_0}$, except the phase fronts are inclined at the Gendrin angle. The 3D field lines form two nested and opposing helices along $\mathbf{B_0}$. The wave field is force free. Using linear superposition, the fields from two phased loops, spaced axially apart by $\lambda/4$, are superimposed, resulting in directional radiation. It is more efficient than rotating field antennas. Whistler standing waves have been generated with oppositely propagating helicons. These waves produce no perfect nodes and have wave polarizations varying spatially between linear and circular. The results are of interest to space and laboratory plasmas.

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