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Helicon and Trivelpiece-Gould modes in uniform unbounded plasmas[1] R. L. STENZEL, J. M. URRUTIA, Physics and Astronomy, UCLA — Helicon modes are whistler modes with angular orbital momentum caused by phase rotation in addition to the axial phase propagation. Although these modes have been associated with whistler eigenmodes in bounded plasma columns, they do exist in unbounded plasmas. Experiments in a large laboratory plasma show the wave excitation with phased antenna arrays, the wave field topology and the propagation of helicons. Low frequency whistlers can have two modes with different wavelengths at a given frequency, called helicons and Trivelpiece-Gould modes. The latter are whistler modes near the oblique cyclotron resonance. The oblique propagation is due to short radial wavelengths near the boundary. In unbounded plasmas, the oblique propagation arises from short azimuthal wavelengths. This has been observed in high-mode number helicons (e.g., $m = 8$). It creates wave absorption in the center of the helicon mode. The strong absorption of the wave can heat electrons and create perpendicular wave-particle interactions. These results may be of interest in space plasmas for scattering of energetic electrons and in helicon plasma sources for plasma processing and thruster applications.

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