Abstract Submitted
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Generation of shear Alfvén waves due to resonant interactions with a spiraling ion beam on the Large Plasma Device[1] SHREEKRISHNA TRIPATHI, BART VAN COMPERNOLLE, WALTER GEKELMAN, PATRICK PRIBYL, Univ of California - Los Angeles, WILLIAM HEIDBRINK, Univ of California - Irvine — The role of Landau and Doppler-shifted ion-cyclotron resonances (DICR) in extracting the free-energy from an ion-beam and destabilizing Alfvén waves was explored. The experiment was conducted on the Large Plasma Device (LAPD) in a dual-species magnetized plasma ($n \approx 10^{10}$–10^{12} cm^{-3}, $T_e \approx 5.0$ eV, B = 1.0–1.8 kG, 92% He^+ and 8% H^+ ions, 19 m long, 0.6 m diam). A hydrogen ion beam (15 kV, 10 A) was obliquely injected into the plasma. The interaction of the beam with the plasma was diagnosed using a retarding-field energy analyzer, three-axis magnetic-loop, and Langmuir probes. Measurements of the beam profiles at multiple axial locations evinced a spiraling ion-beam (J $\approx$ 50-140 mA/cm^2, pitch-angle $\approx 53^\circ$) that traveled at Alfvénic speed (beam-speed/Alfvén-speed = 0.2–1.2). Although, a variety of waves were generated by the beam, this presentation will focus on shear Alfvén waves. Parameters of the ion-beam and ambient plasma were varied to examine the resonance conditions under a variety of scenarios. The experimental results demonstrate that the DICR process is particularly effective in exciting left-handed polarized shear Alfvén waves that propagate in the direction opposite to the ion beam.

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