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Ducted Alfvén Waves in Helicon Plasmas SAEID HOUSHMANDYAR, EARL SCIME, West Virginia University — Recent data from *Hinode* spacecraft, the new high resolution solar imaging mission [*Science*, Dec. 2007], has provided strong evidence for the presence of Alfvén waves in Sun's corona and coronal loops. Damping of Alfvén waves is a strong candidate for explaining the million degree corona. The high density and steep density profile of a typical helicon plasma source makes helicon plasmas a good analog to coronal loop plasma conditions (for example $V_{A-HELIX}/V_{A-Corona} \approx 0.1 - 1$, $\beta_{HELIX}/\beta_{Corona} \approx 0.1 - 10$). Here we present observations of Alfvén waves launched via amplitude modulation of the helicon RF antenna in HELIX (Hot hELIcon eXperiment). Plasma parameters include an ion gyro radius to system length ratio of $\rho_i/L \approx 0.01 - 0.1$, and electron and ion skin depth to system size ratios of $\delta_e/L \approx 0.04 - 0.4$ and $\delta_i/L \approx 2 - 100$ (corresponding coronal values for the same parameters are 0.05-0.2, 0.01-0.1 and 1-100, respectively). The waves are excited at sub-cyclotronic frequencies in argon and helium plasmas. Phase velocity and amplitude measurements in the high density region are reported and compared to an Alfvén wave model that includes the effect of a strong density gradient.

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