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Propagation of Alfvén Waves from Kinetic to Inertial Regimes in a Helicon Plasma Source SAEID HOUSHMANDYAR, EARL SCIME, West Virginia University — Ion heating by Alfvén waves is an active area of research in both laboratory and space plasma physics. As new instruments have enabled more detailed exploration of the solar corona (e.g. *Hinode* spacecraft, *Science*, Dec. 2007), the evidence in support of significant role of Alfvén waves in coronal ion heating continues to accumulate. Due to their high density, helicon sources can be employed for coronal plasma studies (e.g., $\beta_{HELIX}/\beta_{Corona} \cong 0.1 - 1$). However, the non-uniform electron density and temperature profiles of helicon sources ($\bar{\beta} = \beta_{HELIX} m_i \big/ m_e = (\mathrm{v}_{th-e}/\mathrm{v}_A)^2 = 0.1 - 20$) lead to kinetic and inertial regimes in Alfvén wave propagation. As showed by Vincena *et al.* (PRL, **93**, 105003, 2004), the accumulation of magnetic field energy at the kinetic-inertial boundary results from a turning point in the perpendicular group velocity. Here we present observation of Alfvén waves in HELIX (Hot hELIcon eXperiment) launched by a dipole antenna whose axis is aligned along the background magnetic field. The waves are excited at sub-cyclotronic frequencies within the high density region of a helium plasma. Profile measurements of the wave amplitude show evidence of ducting of the waves along the high density core of the plasma as well as wave energy accumulation at the kinetic-inertial boundary. Furthermore, phase and group velocities measurements are also compared to Alfvén wave dispersion models.

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