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Stirring Alfvén waves with kink oscillations: perpendicular dissipation scales from long parallel wavelength modes[1] STEPHEN VINCENA, UCLA — Magnetic flux ropes and shear Alfvén waves occur simultaneously in plasmas ranging from solar prominences, the solar wind, and the earth's magnetotail. If the flux ropes evolve to become unstable to the kink mode, interactions between the kink oscillations and the shear waves can arise, and may even lead to nonlinear phenomena. Experiments aimed at elucidating such interactions are performed in the Large Plasma Device at UCLA. Flux ropes are generated using a LaB_6 cathode discharge (with L=18 m and $0.01 < \beta < 0.1$.) The flux rope (r=8cm) is embedded larger ($r = 30$cm) ambient plasma produced by a second, BaO cathode. Shear Alfvén waves, with azimuthal mode number, $m = -1$ are launched using an internal antenna. When the flux rope is driven kink unstable, $m = +1$ oscillations arise, and the shear wave develops sidebands separated by the kink frequency. The sidebands are shown to clearly satisfy three-wave azimuthal mode number matching, while modes with larger frequency separation from the driving Alfvén wave show decreasing spatial scales approaching dissipation scales ($k_r \sim \rho_s^{-1} \sim \omega_{pe}/c \sim \rho_i^{-1}$). A broadening of the background power spectrum is also observed, and implications for sources in nature are discussed.

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