Abstract Submitted
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Propagating Whistler Spheromaks[1] R.L. STENZEL, J.M. URRUTIA, K.D. STROHMAIER, Physics & Astronomy, UCLA — Whistler modes with wave magnetic field exceeding the ambient field are excited in a large laboratory plasma [PRL 96, 095004 (2006)]. A loop antenna with axis along the dc field produces a field-reversed configuration (FRC). Upon reversal of the ac antenna current, the FRC splits into two oppositely propagating wave packets with field topologies resembling spheromaks. Since no helicity is injected, the two spheromaks have opposite helicities. Their propagation speed is lower than that of linear whistlers and decreases with amplitude. With increasing excitation, the axial size w contracts while the amplitude B grows, making it a form of a whistler soliton ($Bw^2 \sim$ const). The duration of the wave burst can become much shorter than half a wave period. The collisions of two whistler solitons is inelastic: Two counter-propagating spheromaks of opposite helicity merge into a stationary FRC. When the antenna current reverses sign, the wave field adds to the ambient field and produces a single mirror-type field. It also excites two propagating waves ("whistler mirror") with different nonlinear properties from whistler spheromaks. Interactions between these waves will be shown.

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