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Time domain structures in magnetic flux rope experiments[1]
SHAWN WENJIE TANG, WALTER GEKELMAN, PATRICK PRIBYL, STEPHEN VINCENA, University of California, Los Angeles — Time Domain Structures (TDS) are varieties of narrow, intense spikes that appear in the electric potential/field measurements of numerous space observations (e.g. in auroras, planetary magnetospheres) and in laboratory experiments. They appear to be produced by non-linear processes related to plasma instabilities and are believed to be associated with the end state of turbulence. In an ongoing investigation at UCLA, TDS have been observed near the surface of two magnetized flux ropes produced within the LArge Plasma Device (LAPD). Two 11 m long kink-unstable flux ropes were created by a lanthanum hexaboride (LaB_6) source and are encapsulated within a 18 m long background plasma produced by a barium oxide (BaO) cathode. The TDS are observed only when the ropes are kink unstable. Preliminary analysis suggest that the TDS emanate from the reconnection region and migrate to the periphery of the moving ropes. In addition, these structures appear to have Lorentzian character (an indicator of chaotic behavior) and can couple to the kinking of the ropes when more power is delivered to the ropes. The structure of the TDS are currently under investigation through a cross-correlation of the signal between two probes.

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