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Spiky electric potential structures in flux rope experiments[1]
SHAWN WENJIE TANG, WALTER GEKELMAN, PATRICK PRIBYL, STEPHEN VINCENA, University of California, Los Angeles — Spiky structures have been observed in measurements of the electric potential in a magnetized flux rope experiment at UCLA's LArge Plasma Device (LAPD). They are reminiscent of Time Domain Structures (TDS) – narrow, intense electric field spikes that appear in space observations of the aurora and planetary magnetospheres, and are associated with non-linear processes related to plasma instabilities and the end state of turbulence. In the 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 spikes appear near the surface of the two ropes and are highly correlated with the rope motion, only appearing when the ropes are kink unstable. They also seem to emanate from the reconnection region and migrate to the periphery of the ropes at the start of the experiment. In addition, the spikes appear to be driven by deterministic behavior and have characteristics of Lorentzian pulsed signals. A primitive model of the system is presented in an attempt to explain the spikes' occurrence.

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