

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Long lifetime current driven rotating kink modes in a non line-tied plasma column with a free end¹ I. FURNO, T.P. INTRATOR, Los Alamos National Laboratory, D.D. RYUTOV, Lawrence Livermore National Laboratory, S. ABBATE, T. MADZIWA-NUSSINOV, A. LIGHT, L. DORF, G. LAPENTA, Los Alamos National Laboratory — We show the first experimental evidence [1] for a magnetohydrodynamic kink instability in a current rope with one end that is free to move. This free end is insulated by sheath resistivity, which breaks MHD, and is thus not line tied to the axial boundary. We find instability threshold well below the classical Kruskal-Shafranov threshold. The presence of an axial flow gives rise to a doppler shifted frequency and rotation of the kink where the eigenfunction is axially pushed in the flow direction. This oscillating and rotating state persists indefinitely without disruptions for a long lifetime. Striking agreement with a theoretical analysis is demonstrated.

[1] I. Furno, T. P. Intrator, D.D. Ryutov et al. “Current-Driven Rotating-Kink Mode in a Plasma Column with a Non-Line-Tied Free End.” Physical Review Letters, **97**: 015002 (2006).

¹supported by DOE/LANL contract DE-AC52-06NA25396 and Laboratory Directed Research Development.

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Date submitted: 21 Jul 2006

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