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Rotating kink modes in a non-line tied plasma column in the Reconnection Scaling experiment TSITSI MADZIWA-NUSSINOV, IVO FURNO, THOMAS INTRATOR, ADAM LIGHT, Plasma Physics Group (P-24), Los Alamos National Laboratory, DMITRI RYUTOV, Lawrence Livermore National Laboratory, SARA ABBATE, Politecnico di Torino — The screw pinch is one of the simplest MHD equilibria, and is relevant to fusion physics, astro-physics, and basic plasma physics. It has been studied for many years, but usually in the context of a periodic toroidal plasma column. Reconnection Scaling Experiment (RSX)[1] is a cylindrical device built to study the linear and non-linear evolution of the current carrying screw pinch. A plasma column is injected into one end of the chamber from a plasma gun, and terminates at an anode that can be biased to draw current. This anode acts as an adjustable non-line tied end boundary for the column. Line-tying appears to give rise to several unexpected characteristics including finite rotation frequency, and a kink instability threshold less than the Kruskal Shafranov predictions. Experimental data is compared to a phenomenological theory of the kink instability developed for a slender plasma[2] column, including effects such as boundary conditions at the electrodes, finite plasma resistivity and axial flow.

[1] I. Furno *et al.*, Rev. Sci. Instrum. **74**, 2324 (2003).2] D. Ryutov et al., to be submitted to Phys. Plasmas.

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