

Abstract Submitted
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Study of the equilibrium, stability and magnetic self-organization of line-tied toroidal plasma discharges¹ M. YAMADA, E. OZ, C. MYERS, H. JI, R. KULSRUD, PPPL — A set of electrodes are inserted into MRX (1) to generate line-tied toroidal plasmas which can be regarded as flux ropes. The 3-D structure of these plasmas is monitored by a fast framing camera and magnetic probes (2). Time resolved measurements of discharges with peak currents of 10–30 kA reveal that both stable and unstable flux ropes can be formed with their ends line-tied to the electrodes. It is found that the magnetic tension force of the toroidal field lines plays an important role in these equilibria. Using the q value, which describes the rotational transform of field lines, the stability condition for external kink modes is found to be consistent with the Kruskal-Shafranov limit with modified line-tied boundary conditions. Additionally, internal relaxation events are observed even after the flux rope stabilizes against the external kink mode. The basic features of the self-organization events will also be discussed. (1) M. Yamada et al, Phys. Plasmas, v4,1936 (1997), (2) E. Oz et al: This conference.

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