Abstract Submitted
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Microscopic Processes Involved in the Transition from a Disk to a Ring Sequence B. COPPI, MIT — In a differentially rotating plasma structure, in the prevailing gravity of a central object, it is realistic to consider $\epsilon_m = D_m/(Hv_A) << 1$, where $D_m = \eta\ c^2/4\pi$, η is the plasma resistivity, v_A is the Alfvén velocity, and H is the height of the structure. Therefore, the frozen-in- law can be applied when dealing with global scale distances. However, the transition from a disk configuration[1] to a ring sequence configuration[2] in a structure imbedded in an external magnetic field with a "seed" vertical component involves the formation of a periodic sequence of new closed magnetic surfaces[1] similar to those characteristic of Field Reverse Configurations. Pairs of counter-streaming (around the axis of rotation) current "filaments" form these very large aspect ratio toroidal configurations. The transition occurs when the field produced by the internal currents is equal (and of opposite direction) to that in which the structure is immersed. Then, magnetic reconnection has to be considered. The region in which the poloidal field is null can be viewed as a coalescence of two X-points and two O-points which, after the transition has occurred, tend to separate. The scale distances involved are much smaller than the characteristic global scale distances, such as H, the characteristic values of the collisional mean free paths need to be considered, and relevant microscopic reconnection processes are analyzed. *Sponsored in part by the U.S. DOE.

[1]B. Coppi *Phys. Plasmas* **12**, 057301, (2005)
[2]B. Coppi and F. Rousseau, *Ap. J.* **641** (1), 458 (2006).

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