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MHD kink instability driven by differential rotation CHRISTOPHER CAREY, CARL SOVINEC, SEBASTIAN HEINZ, University of Wisconsin
— Recent observations of extragalactic outflows from active galactic nuclei suggest that some of these jets maintain a large scale helical magnetic structure [1]. The kink instability is known to create similar magnetic structures in laboratory plasmas. Thus, extragalactic jets may resemble a screw pinch topology and be susceptible to the current driven kink instability. We are conducting numerical MHD simulations which will address the issues of collimation and stability of the extragalactic jet system. In these simulations an initial seed field is twisted by a differentially rotating flow boundary condition. Three dimensional nonlinear calculations show that the magnetic column produced is kink unstable and that the instability saturates to a helical magnetic structure. The kink instability in the numerical system leads to conversion of the toroidal magnetic flux, which is injected by the differentially rotating boundary, to poloidal magnetic flux. Examination of this flux conversion process could lead to a better understanding of how the jet distributes magnetic energy to the medium which surrounds it. A synthetic diagnostic has been implemented for calculating the synchrotron emission of the numerical jet. This synthetic synchrotron emission is compared to observations of actual extragalactic jet systems.
[1] D.M. Worrall, M. Birkinshaw, et. al., Mon. Not. R. Astron. Soc., May, 2007

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