

Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Boundary Condition Effects and the Role of Helicity Conservation in Dynamos in Taylor-Couette Flows KRISTA MARTOCCI, University of Chicago — I will present three-dimensional simulations of magnetized, Taylor-Couette flows in the centrifugally stable regime. In this regime the motions are initialized by the magno-rotational instability (MRI). Three different initial magnetic field configurations and boundary conditions are considered. The purpose of this work is to investigate the role magnetic helicity conservation in the operation and stability of the dynamo. We show evidence of large-scale dynamo action when boundary conditions are applied that allow a flow of magnetic helicity out of the domain. Simulations seeded with an existing dynamo solution having vertical, periodic boundaries are shown to be unstable. A system conserving helicity by only allowing horizontal fields at the boundaries can only sustain fields and turbulence when external currents are applied. This supports the need for a helicity outflow to generate a successful large-scale dynamo.

Krista Martocci
University of Chicago

Date submitted: 12 Jul 2013

Electronic form version 1.4