

Momentum Transport: Progress, Plans, and Perspectives

D. Craig and J. Goodman

CMSO General Meeting
San Diego, CA
March 3-4, 2005

We continue to concentrate on five areas of emphasis:

1. Momentum transport by stochastic magnetic fields
2. Maxwell Stress due to current driven instabilities
3. Maxwell Stress due to magnetorotational instability
4. Generation and relaxation of momentum as part of a two-fluid form of magnetic relaxation
5. Momentum transport in the sun

Have seen progress on first 4, number 5 has been on hold

Experiment/Computation/Theory Balance

- Experimental progress has been good, but with limited new results
 - Investments should pay off in results in 1-2 years
 - MST remains primary forum for momentum transport
- Computational progress has been good, but lots of potential for more
 - Recently increased staffing should accelerate progress
- Theory progress has been limited to MRI
 - Now beginning to look at how to get others involved
 - In some cases, experimental or computational progress may motivate more analytic work

Lab-Astro Connections in our Plans

- Assess momentum transport by stochastic field in astrophysics (e.g. in accretion disks or the interior of the sun)
- Explore analogs of Maxwell stress by coupled tearing modes which might be relevant to astrophysical jets
- Explore flow driven relatives of MRI in lab
- Examine MRI in liquid metal experiment
- Examine applicability of two fluid relaxation to jet-lobe-disk system

Potential Highlights

- Strong potential for high impact lies in exploiting links between the six CMSO topics
- Potential links with momentum that might be able to produce “highlight” results:

Dynamo - Momentum Transport - Helicity

- How is momentum transport from MRI and the generation of jets related to generation of large scale magnetic structure in the disk-jet-lobe system?
- Are momentum transport and dynamo fundamentally connected in the lab? If so, how?