Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02003, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02003
EGU General Assembly 2008

Helical magnetorotational instability in a liquid metal experiment with reduced Ekman pumping

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The magnetorotational instability (MRI) is one of the most promising candidates to explain turbulence and angular momentum transport in accretion disks which is essential to understand the mass accumulation of stars and black holes. Only recently, a possible connection of MRI with the dynamo process in the Earth's core was discussed. We study a special type of MRI in a Taylor-Couette experiment with the liquid metal alloy GaInSn under the influence of a helical magnetic field (Phys. Rev. Lett. 97, 184502; Astrophys. J. 649, L145-L147; New J. Phys. 9, 295). This helical MRI sets in at Reynolds numbers of the order 1000 and Hartmann numbers of the order 10, quite in contrast to the standard MRI with a purely axial magnetic field which would require much larger values. Particular focus is laid on recent results of a modified experiment with strongly reduced Ekman pumping at the endplates in which sharper transitions between stable and unstable regimes are observed.