Geophysical Research Abstracts, Vol. 8, 00695, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00695

Simulations of MHD turbulence in the solar corona by coupled shell-models

E. Buchlin (1) and M. Velli (1,2)

(1) Dipartimento di Astronomia e Scienza dello Spazio, Università di Firenze, Florence, Italy,
(2) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

So as to get statistical results on MHD turbulence that cannot be obtained by direct numerical simulations (which have small Reynolds numbers and give too short time series), we propose a model consisting in simplified models of the non-linear terms of MHD (shell-models, e.g. Giuliani & Carbone 1998) coupled by Alfvén waves propagating along a dominant magnetic field B_0. In the case of a magnetic loop in the solar corona, the energy is introduced at the loop foot-points by the motions of the photosphere, and we analyze the fields and the heating that are obtained (turbulent spectra, cross-scale energy flux, intermittency, properties of dissipation and dependence on parameters, distributions of events, correlations...). A more realistic loop can be obtained thanks to a stratification along B_0 (with a given profile of Alfvén velocity). Furthermore, the stratification makes it also possible to simulate other regions of space where plasmas can be modelled by MHD, such as the magnetically open regions of the corona, in which turbulence is produced by the interactions between the Alfvén waves propagating upwards and the ones which are reflected downwards (see submission by Andrea Verdini in this session).