

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Magnetic dynamo action in helical turbulence¹ LEONID MALYSHKIN, Department of Astronomy & Astrophysics, University of Chicago, STANISLAV BOLDYREV, Department of Physics, University of Wisconsin-Madison, CMSO COLLABORATION — We investigate magnetic field amplification in a turbulent velocity field with nonzero helicity, in the framework of the kinematic Kazantsev-Kraichnan model. We present the numerical solution of the model for the practically important case of Kolmogorov distribution of velocity fluctuations, with a large magnetic Reynolds number. We found that in contrast with the non-helical case where growing magnetic fields are described by a few bound eigenmodes concentrated inside the inertial interval of the velocity field, in the helical case the number of bound eigenmodes considerably increases, moreover, new unbound eigenmodes appear. Both bound and unbound eigenmodes contribute to the large-scale magnetic field. This indicates a limited applicability of the conventional alpha-model of a large-scale dynamo action, which captures only unbound modes.

¹Supported by the NSF sponsored Center for Magnetic Self-Organization.

Leonid Malyshkin
Department of Astronomy & Astrophysics, University of Chicago

Date submitted: 21 Jul 2007

Electronic form version 1.4