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Thank you for your contribution to RMPP.

Quite interesting paper on Small-scale turbulent dynamo by Prof. Siyao Xu and Alex Lazarian is published in RMPP. If you are AAPPS-DPP member, you may have access code and can download this paper.

<https://link.springer.com/article/10.1007/s41614-021-00051-3>

With best regards,

M. Kikuchi, RMPP Chair and AAPPS-DPP CEO

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REVIEW PAPER



Small-scale turbulent dynamo in astrophysical environments: nonlinear dynamo and dynamo in a partially ionized plasma

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Abstract

Small-scale turbulent dynamo is responsible for the amplification of magnetic fields on scales smaller than the driving scale of turbulence in diverse astrophysical media. Most earlier dynamo theories concern the kinematic regime and small-scale magnetic field amplification. Here we review our recent progress in developing the theories for the nonlinear dynamo and the dynamo regime in a partially ionized plasma. The importance of reconnection diffusion of magnetic fields is identified for both the nonlinear dynamo and magnetic field amplification during gravitational contraction. For the dynamo in a partially ionized plasma, the coupling state between neutrals and ions and the ion-neutral collisional damping can significantly affect the dynamo behavior and the resulting magnetic field structure. We present both our analytical predictions and numerical tests with a two-fluid dynamo simulation on the dynamo features in this regime. In addition, to illustrate the astrophysical implications, we discuss several examples for the applications of the dynamo theory to studying magnetic field evolution in both preshock and postshock regions of supernova remnants, in weakly magnetized molecular clouds, during the (primordial) star formation, and during the first galaxy formation.

Keywords Magnetohydrodynamics in astrophysics · Turbulence plasma · Plasma dynamos