Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Progress in the study of magnetic dynamo generation processes by non-Gaussian, non-Markovian velocity fluctuations using meshless, Lagrangian numerical schemes RAUL SANCHEZ, J. MIGUEL REYNOLDS-BARREDO, Universidad Carlos III de Madrid, DAVID E. NEWMAN, University of Alaska at Fairbanks — The generation of magnetic dynamos by turbulent velocity fields is traditionally studied, at the simplest level, by assuming near-Gaussian, random velocity fluctuations. This allows to express the effective electromotive force in terms of a piece proportional to the large-scale magnetic field (the α-term) and another proportional to its curl (the β term), once certain symmetry conditions are assumed. Physically, the α-term is a measure of the mean helicity of the flow and drives the dynamo. Previously, we examined theoretically the consequences of assuming instead Levy-distributed, Lagrangianly-correlated velocity fields, which have been recently identified as relevant in regimes of near-marginal turbulence (superdiffusion) or in the presence of strong, stable sheared flows (subdiffusion). Here, we report on recent numerical progress on the study of these processes by implementing the kinematic dynamo equation using a meshless numerical method inspired by the SPH schemes frequently used in hydrodynamics. The results suggest that subdiffusive flows may importantly enhance the dynamo generation, even in the absence of mean helicity, which might be meaningful for the understanding of dynamo generation in situations where sheared, zonal flows are present.

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Date submitted: 24 Jul 2015 Electronic form version 1.4