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Investigation of magnetic field generation by non-Gaussian, non-Markovian velocity fluctuations using meshless, Lagrangian numerical schemes RAUL SANCHEZ, Univ Carlos III De Madrid, DAVID NEWMAN, University of Alaska at Fairbanks — Turbulent velocity fields can generate perturbations of the electric current and magnetic field that, under certain conditions, may generate an average, large-scale magnetic field. Such generation is important to understand the behavior of stars, planetary and laboratory plasmas. This generation is traditionally studied by assuming near-Gaussian, random velocity fluctuations. This simplification allows to exprese the effective electromotive force in Faraday's law in terms of a piece proportional to the large-scale magnetic field itself (the α-term) and another proportional to its curl (the β term) assuming certain symmetry conditions are met. Physically, the α-term is a measure of the mean helicity of the flow and drives the dynamo process. In a previous contribution, we examined theoretically what consequences would follow from assuming instead Levy-distributed, Lagrangianly-correlated velocity fields, that have been recently identified as of relevance in regimes of near-marginal turbulence or in the presence of a strong, stable sheared flow. Here, we will discuss and extend these results numerically by implementing the kinematic dynamo equation using a Lagrangian, meshless numerical method inspired by the SPH schemes frequently used in hydrodynamics.

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