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Nonlinear Alfvén waves and recurrences in 3D Magnetohydrodynamics RUPAK MUKHERJEE, RAJARAMAN GANESH, ABHIJIT SEN, Institute for Plasma Research — Within the framework of MagnetoHydroDynamics, a strong interplay exists between flow and magnetic fields. This interplay is known to lead to several interesting phenomena such as mean-field and fluctuation (or small scale) dynamos, magnetic re-connection and recurrence phenomena, to name a few. Using a set of chaotic flow fields (eg, Arnold-Beltrami-Childress, Taylor-Green etc) driven at certain scales, we numerically integrate a self-consistent set of driven, 3D, weakly compressible MHD equations to study two fundamental processes, namely, the generation of mean magnetic field from the flow fields and the magnetic recurrence phenomena mediated by a dynamical exchange between magnetic and velocity fields via a reconnection process. After demonstrating the numerical convergence, we attempt possible explanation using Hamiltonian field models.

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