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A generalized model for small scale dynamo at finite correlation times KANDASWAMY SUBRAMANIAN, IUCAA, India, PALLAVI BHAT, PPPL, Princeton, US — Fluctuation (or small scale) dynamos are generic in astrophysical plasmas. The Kazantsev model of the fluctuation dynamo assumes a delta-correlated in time velocity field, which is unrealistic. Using renewing flows with finite time correlation, τ, we derive a generalized model of the fluctuation dynamo. We recover the standard Kazantsev equation for the evolution of longitudinal magnetic correlation, M_L, for $\tau \to 0$. The generalized equation involves third and fourth spatial derivatives of M_L indicating nonlocality. We solve the equation in the large k limit and by using Landau-Lifschitz approach, we recast the equation to one which involves at most second derivatives of M_L. Remarkably, we then find that the magnetic power spectrum, remains the Kazantsev spectrum of $M(k) \propto k^{3/2}$, in the large k limit, independent of τ.

Pallavi Bhat
PPPL, Princeton

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