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PERPENDICULAR DIFFUSION OF ENERGETIC PARTICLES IN NOISY REDUCED MAGNETOHYDRODYNAMIC TURBULENCE

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A model for noisy reduced magneto-hydrodynamic (NRMHD) turbulence was recently proposed. This model was already used to compute the diffusion coefficient of random walking magnetic field lines based on the nonlinear diffusion theory. We use the same model to investigate the
diffusion of energetic particles across the mean magnetic field. To do that we have used two analytical theories, namely, the Non-Linear Guiding Centre (NLGC) theory and the Unified Non-Linear Transport (UNLT) theory. Furthermore, we performed test-particle simulations to obtain field line diffusion and particle transport coefficients. It is shown that both theories provide very different results for the aforementioned turbulence model. In addition, only the UNLT theory agrees with simulations confirming that it accurately describes perpendicular transport and that it is a powerful tool in diffusion theory.

Collaboration

– not specified –

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