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Transport of particles in chaotic, time dependent, magnetic fields[1]
B. DASGUPTA, CSPAR, UAlabama, A. K. RAM, MIT-PSFC, F. HOLGUIN, UMichigan, M. S. JANAKI, S. SAMANTA, P. K. SHAW, SINP, India — Magnetic fields in regions of low plasma pressure and large currents, such as in interstellar space and gaseous nebulae, are force-free as the Lorentz force vanishes. The three-dimensional Arnold-Beltrami-Childress (ABC) field is an example of three-dimensional, force-free, helical, chaotic magnetic field [1]. However, the ABC field is chaotic only if all three coefficients describing the field are non-zero. Otherwise, the field lines are regular and well behaved. The ABC fields correspond to Beltrami flows. The characteristic motion of particles in the chaotic ABC field is superdiffusive in space [1]. We consider the dynamics of particles when the ABC field is superimposed onto a larger amplitude uniform magnetic field. We further assume the ABC field to have sinusoidal time dependence, with a prescribed frequency. In this case the particles not only undergo cross-field diffusion but also gain energy. We present results on the cross-field diffusion of particles and on their energization and compare to the case when the ABC field is not chaotic. [1] A.K. Ram *et al.*, *Phys. Plasmas* **21**, 072309 (2014).

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