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# Theory of stochastic acceleration mechanisms in solar system plasmas

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We establish a classification scheme for stochastic acceleration mechanisms involving low-frequency MHD turbulence in astrophysical plasmas. This classification takes into account both the properties of the accelerating electromagnetic field, and the nature of the transport of charged particles in the acceleration region. We group the acceleration processes as either resonant, non-resonant, or resonant-broadened, depending on whether the particle motion is free-streaming along the magnetic field, diffusive, or a combination of the two. Stochastic acceleration by moving magnetic mirrors, adiabatic compression and turbulent magnetic reconnection are addressed as illustrative examples. We obtain expressions for the momentum-dependent diffusion coefficient D(p), both for general forms of the acceleration field and for the situation where the electromagnetic force is wave-like. Finally, for models considered, we calculate the energy-dependent acceleration time, a quantity that can be directly compared with observations, in particular of the time profile of the radiation field produced by the accelerated particles, such as those occuring during solar flares.