Abstract: Turbulence spectra are of fundamental importance to charged-particle transport. Analytical calculations of diffusion coefficients typically assume a flat energy range of the turbulence spectrum for mathematical convenience. This however has unphysical consequences like a diverging ultrascle. When the assumption of a flat energy range is relaxed, a numerical approach to the perpendicular diffusion coefficient is usually followed. In this paper we discuss approximate analytical expressions for the perpendicular diffusion coefficient for the case when the energy range is not flat. While not necessarily elegant, they illustrate the dependence on the various turbulence quantities and significantly improve the computational efficiency of three-dimensional numerical modulation models.

Keywords: Turbulence spectra, perpendicular diffusion.