THE SMALL PITCH ANGLE SCATTERING IN THE SECOND ORDER APPROXIMATION

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The diffusive particle propagation and its pitch angle scatteringis studied using kinetic equation of the Fokker - Planck form.Due to existence of the strong regular magnetic field (MF) theparticles are preferable propagated along the mean MF directionand undergo the pitch angle scattering with respect to it.The paper deals with solution of the equation in the second orderapproximation in the pitch angle, θ, which reads (in usual notation) $$ \partial_t f + v \left(1-{\theta^2\over 2}\right) \partial_x f = {v\over\lambda\theta}\ \partial_\theta\ \theta\ \partial_\theta f+ \delta(x)\ \delta(t)\ \frac{\delta(\theta-\theta_0)}{\theta_0}\, , $$ λ is the particle mean free path. The exact analyticalsolution is obtained in an integral form. The well known solutionin the first order pitch angle approximation can be restoredperforming the small time limit in the result. Unlike the firstorder solution the obtained solution in the second approximationrightly shows that the pitch angle diffusion is closely connectedwith the particle transport along the mean MF. The expression for particle density for the point instantaneous unidirectional source has been obtained too.