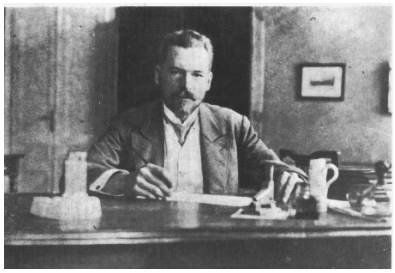

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Non-diffusive Fluxes in Brownian System with Lorentz Force

The Fokker-Planck equation provides complete statistical description of a particle undergoing random motion in a solvent. In the presence of Lorentz force due to an external magnetic field, the Fokker-Planck equation picks up a tensorial coefficient, which reflects the anisotropy of the particle motion. This tensor, however, can not be interpreted as a diffusion tensor; there are antisymmetric off-diagonal terms which give rise to fluxes perpendicular to the density gradients. Here, we show that for an inhomogeneous magnetic field these non-diffusive fluxes have finite divergence and therefore affect the density evolution of the system. Only in the special cases of the uniform magnetic field or carefully chosen initial condition with the same symmetry as the magnetic field, can these fluxes be ignored in the density. These non-diffusive fluxes are reminiscent of the Corbino effect in solid-state systems.

Summary

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