

[nex61] Fokker–Planck eq. for Brownian particle: stationary solution.

Determine the stationary distribution $P(\mathbf{x}, \mathbf{v}, t) = P_S(\mathbf{v})$ of the Fokker-Planck equation for Brownian particles,

$$\frac{\partial P}{\partial t} + \mathbf{v} \cdot \nabla P = \xi \nabla_v \cdot \left(\mathbf{v} P + \frac{k_B T}{m} \nabla_v P \right),$$

under the assumption that it is spatially uniform and isotropic.

Solution: