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Generalized formulation of Brownian Vortexes HENRIQUE W. MOYSES, ROSS BAUER, DAVID G. GRIER, Department of Physics and Center for Soft Matter Research, New York University — Brownian vortexes are stochastic noise driven machines that arise from the motion of particles subjected to static non conservative force fields. This motion is characterized by a toroidal circulation in the probability flux whose direction can be tuned by changing the temperature of the system. A discrete minimal model for Brownian Vortexes were described by previous work done by B.Sun, D.G.Grier and A.Y.Grosberg. Here we theoretically look for a continuous model in the form of a generalization of the equilibrium Boltzmann relation for the probability density in the case where the driven forces have a non conservative solenoidal component. This generalized relation features the temperature induced probability flux reversal. We further extend our theory to time dependent force fields and study the possibility of stochastic resonance in the characteristic frequency of circulation of the driven particle. This model is experimentally applied to investigate the motion of colloidal spheres in an optical trap whose intensity is oscillatory in time.

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