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A General Model for Brownian Vortexes HENRIQUE MOYSES, ROSS BAUER, DAVID GRIER, Department of Physics and Center for Soft Matter Research, New York University — Brownian Vortexes are a class of non-equilibrium steady states that arise from the motion of Brownian particles in non-conservative force fields. At non-zero temperature the non-conservative part of the force bias the particles' fluctuations into probability currents, which due to the conservation of probability should feature closed loops. Previous studies have shown that Brownian Vortexes comprise a distinct class of stochastic processes whose direction and topology of the developed flux can be tuned by changing the temperature of the system. Here we present a general model for Brownian Vortexes that is based on a perturbation theory scheme of the Fokker - Planck equation to get the probability distribution and non-equilibrium steady state flux of such system. This generalized model features the temperature induced probability flux reversal and topological changes characteristic of this stochastic system in the case where the non-conservative part of the force is small compared to the conservative one. We further compare the theoretically predicted results with numerical simulations and propose an experimental test system based on the motion of colloidal particles in optical traps.

Henrique Moyses
New York University

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