

Levy flights as a time continuous process

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On the basis of multivariate Langevin processes we present a realization of Lévy flights as a time continuous process. For the simple case of a particle moving under the influence of friction and a velocity dependent stochastic force we explicitly derive the generalized Langevin equation and the corresponding generalized Fokker-Planck equation describing Lévy flights. Our procedure is similar to the treatment of the Kramers-Fokker Planck equation in the Smoluchowski limit.

The proposed approach forms a feasible way of tackling Lévy flights in inhomogeneous media or systems with boundaries what is up to now a challenging problem. The same analysis is carried out for multidimensional model.

The developed model is a promising approach to constructing a description of Lévy flights in heterogeneous media and systems with boundaries.