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Dynamics of confined Levy flights in terms of (Levy) semigroups

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The master equation for a probability density function (pdf) driven by L\'{e}vy noise, if conditioned to conform with the principle of detailed balance, admits a transformation to a contractive strongly continuous semigroup dynamics. Given a priori a functional form of the semigroup potential, we address the ground-state reconstruction problem for generic L\'{e}vy-stable semigroups, for {\em all} values of the stability index $\mu \in (0,2)$. That is known to resolve an invariant pdf for confined L\'{e}vy flights (e.g. the former jump-type process). Jeopardies of the procedure are discussed, with a focus on: (i) when an invariant pdf actually is an asymptotic one, (ii) subtleties of the pdf $\mu $-dependence in the vicinity and sharply {\em at} the boundaries 0 and 2 of the stability interval, where jump-type scenarios cease to be valid.

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