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Long-time behaviour of some Markov processes

Let

$$Lf(x) = \int_{\mathbb{R}^d} \big(f(x+u) - f(x) - \nabla f(x) \cdot u 1_{|u|\le 1}\big)\, \nu(x, du), \tag{1}$$

where $\nu(x, du)$ is a Lévy type kernel. Suppose that $(L, C^2_\infty(\mathbb{R}^d))$ extends to a generator of a Feller semigroup $(P_t)_{t\ge 0}$. Denote by X the respective Markov process.

We investigate the sufficient conditions of the recurrence and transience of X. For this we employ the Forster-Lyapunov criterion.

This work is partly motivated by the recent paper of N. Sandrić [1].

References

[1] N. Sandrić, *Long-time behavior of stable-like processes*, Stoch. Proc. Appl. (2013).