Singular Stochastic Differential Equations Driven by Markov Processes

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Abstract: We prove the pathwise uniqueness for strong solutions of singular stochastic differential equation driven by a family of Markov process, whose generator is a non-local and non-symmetric Lévy type operator of the form

$$\mathcal{L}\varphi(x) = \int_{\mathbf{R}^d} \left[\varphi(x+z) - \varphi(x) - 1_{\{|z|\le 1\}} z \cdot \nabla\varphi(x)\right] \sigma(x,z)\nu(\mathrm{d}\, z) + b(x)\cdot\nabla\varphi(x), \quad \forall \varphi \in C_0^\infty(\mathbf{R}^d).$$