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A random wave operator for a classical point particle

We are going to consider systems, describing classical point particles, which are subject to a deterministic force and a White Noise. The generator of the corresponding Markovian semi group is of the form

$$\mathcal{L} = \Delta_v + v \cdot \nabla_x + K(x) \cdot \nabla_v$$

where Δ_v represents the Laplace operator with respect to $x \in^d$ and $\nabla_x,\ \nabla_v$ the gradients with respect to $x,\ v \in^d$. $\mathcal{L}_0 = \Delta_v + v \cdot \nabla_x$ is the wellknown example of a hypoelliptic nonsymmetric operator satisfying a weak Hörmander condition. I have given general sufficient conditions for the existence of strong solutions without regularity assumptions on K. In particular, these conditions allow for a growth at infinity stronger than linear. Since the generator is degenerate, non regular, and nonsymmetric, the techniques for studying the standard diffusions do not apply.

The existence and in particular the asymptotic completeness of a classical random wave operator for the processes associated with $\mathcal{L}$, $\mathcal{L}_0$, and nondegenerate diffusion operators are shown.