

On a possibility of hit for some sets relative to certain time inhomogeneous diffusion processes

DaeHong Kim and Yoichi Oshima
(Kumamoto University)

Let (E, F) be an irreducible and strongly local Dirichlet form on $L^2(X; m)$ given by

$$E(\varphi, \psi) = \frac{1}{2} \int_X d\mu_{\langle \varphi, \psi \rangle}(x), \quad \varphi, \psi \in F.$$

Take a function $\rho(t, x) > 0$ and consider the family of Dirichlet forms $(E^{(t)}, F \cap L^2(\rho^2(t, \cdot)m))$ given by

$$E^{(t)}(\varphi, \psi) = \frac{1}{2} \int \rho^2(t, x) d\mu_{\langle \varphi, \psi \rangle}.$$

Let $\mathbf{M}^\rho = (X_t, P_{(s,x)}^\rho)$ be a time inhomogeneous diffusion process associated with $E^{(t)}$. In this talk, for certain set $D \subset X$, we give general conditions on ρ for $P_{(s,x)}^\rho(\sigma_D < \infty) = 1$ or $\lim_{s \rightarrow \infty} P_{(s,x)}^\rho(\sigma_D < \infty) = 0$. In particular, for the Dirichlet form (E, F) associated with Brownian motion and $\rho^2(t, x) = k \exp(-(U(x)/c) \log(1+t))$, the general conditions are applied to show the possibility of hitting of the level sets of U .