Boundary trace of symmetric reflected diffusions

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摘要： Starting with a transient irreducible diffusion process X^0 on a locally compact separable metric space (D, d), one can construct a canonical symmetric reflected diffusion process $\overline{X}$ on a completion D^* of (D, d) through the theory of reflected Dirichlet spaces.

The boundary trace process $\check{X}$ of X on the boundary $\partial D := D^* \setminus D$ is the reflected diffusion process $\overline{X}$ time-changed by a smooth measure ν having full quasi-support on ∂D. The Dirichlet form of the trace process $\check{X}$ is called the trace Dirichlet form.

In the first part of the paper, we give a Besov space type characterization of the domain of the trace Dirichlet form for any good smooth measure ν on the boundary ∂D. In the second part of this paper, we study properties of the harmonic measure of $\overline{X}$ on the boundary ∂D. In particular, we provide a condition equivalent to the doubling property of the harmonic measure. Finally, we characterize and provide estimates of the jump kernel of the trace Dirichlet form under the doubling condition of the harmonic measure on ∂D.

This is based on a joint work with Shiping Cao.