

Conservation property and recurrence of Dirichlet forms

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Abstract

In this talk we will discuss fundamental longtime properties of a stochastic process: the conservation property and recurrence, and introduce new characterizations. The conservation property and recurrence have been extensively studied for Brownian motion on a Riemannian manifold, and we know that if the manifold doesn't have any singular set or it has a "small" singular set, and, if the volume growth is not too "big" at infinity, then Brownian motion is conservative and recurrent depending on how rapidly the volume grows at infinity. A natural question is what remains true and what doesn't for more general stochastic processes, for example, a symmetric jump-diffusion defined on a metric measure space. In this talk, we will answer this question from several different points of view. Time permitting, I would like to discuss the Dirichlet extensions of Markov forms as well as the essential selfadjointness of the operator restricted to a natural domain as a related topic using new and interesting examples of Riemannian manifolds and infinite graphs. These results were obtained in my recent collaborative efforts with several different groups.