

Hausdorff measures from Brownian Local Times

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This is a six lectures introductory course on the measure-theoretic properties of the geometry of Local Times of the Brownian Motion. It is accessible to students from graduate programs in statistics and mathematics that have undertaken a course in measure theory.

The Brownian motion is a stochastic process that is a central object in probability theory and its applications. A Brownian local time is roughly speaking the amount of time spent by a Brownian path at a given level. Local times allows a suitable disintegration of the occupation measure for the Brownian motion and plays an important role in applications of the Brownian Motion and derived areas of study as in the theory of stochastic differential equations. Then questions related to regularity and measure-theoretic properties of Brownian local times became a major topic related to Brownian motion. The answers to them are the main topics of this course that aims at the description of Brownian local times as generalised Hausdorff measures.

The following topics are going to be presented: The Brownian Motion and basic properties. Path properties of the Brownian Motion. The law of the iterated logarithm. The Zero Set of the Brownian Motion and its Hausdorff dimension. Brownian Local Times and main properties. Trotter's Theorem. Generalised ϕ -Hausdorff measures and Rogers-Taylor Theorem. The Hausdorff function for the zero level set of the Brownian Motion.

Referências:

1. P. Mörters, Y. Peres: *Brownian Motion*; Cambridge Series in Statistical and Probabilistic Mathematics, Cambridge University Press, 2010.
2. D. Revuz, M. Yor: *Continuous Martingales and Brownian Motion*; A series of comprehensive studies in mathematics Volume 293, 3rd edition, 2000.