THE FOURTH CHARACTERISTIC OF A SEMIMARTINGALE

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The notion of stochastic differential equations (SDEs) is closely linked to that of semimartingales. The latter one serves both, as a source for drivers of the equations as well as their solutions. Furthermore, there is an intimate relationship between the coefficients of the SDE and the characteristics of the solution.

In the talk we focus on this latter concept: three semimartingale characteristics have been used for nearly 40 years. However, there is evidence that a fourth characteristic would be natural. We motivate the existence of such a fourth quantity by analyzing Lévy and Feller processes. Having generalized the notion of semimartingales slightly, we introduce the fourth characteristic, show some examples and emphasize the close relationship between the generator of a Markov process with killing and the (now four) characteristics.

In the context of SDEs this allows us to use driving processes which leave the state space and to add a kind of killing potential.

References