From State Dependent Diffusion to Constant Diffusion in Stochastic Differential Equations by the Lamperti Transform

This report describes methods to eliminate state dependent diffusion terms in Stochastic Differential Equations (SDEs). Transformations that leave the diffusion term of SDEs constant is important for simulation, and estimation. It is important for simulation because the Euler approximation convergence rate is faster, and for estimation because the Extended Kalman Filter equations are easier to implement than higher order filters needed in the case of state dependent diffusion terms. The general class of transformations which leaves the diffusion term independent of the state is called the Lamperti transform. This note gives an example driven introduction to the Lamperti transform. The general applicability of the Lamperti transform is limited to univariate diffusion processes, but for a restricted class of multivariate diffusion processes Lamperti type transformations are available and the Lamperti transformation is discussed for both univariate and multivariate diffusion processes. Further some special attention is needed for time-inhomogeneous diffusion processes and these are discussed separately.

General Information
Publication status: Published
Organisations: Mathematical Statistics, Department of Informatics and Mathematical Modeling
Contributors: Møller, J. K., Madsen, H.
Number of pages: 25
Publication date: 2010

Publication Information
Place of publication: Kgs. Lyngby, Denmark
Publisher: Technical University of Denmark, DTU Informatics, Building 321
Original language: English
Keywords:
Electronic versions:
tr10_16.pdf
Source: orbit
Source ID: 271164
Research output: Book/Report › Report – Annual report year: 2010 › Research