

On parameter estimation for periodic diffusion processes I

Reinhard Höpfner (hoepfner@mathematik.uni-mainz.de), Mainz, Germany

(joint work with Yuri Kutoyants)

Abstract

We consider a diffusion $(\xi_t)_{t \geq 0}$ whose drift contains some deterministic periodic signal. Its shape being fixed and known, up to scaling in time, the periodicity of the signal is the unknown parameter ϑ of interest. We consider sequences of local models at ϑ , corresponding to continuous observation of the process ξ on the time interval $[0, n]$ as $n \rightarrow \infty$, with suitable choice of local scale at ϑ . Our tools –under an ergodicity condition– are path segments of ξ corresponding to the period ϑ , and limit theorems for certain functionals of the process ξ which are not additive functionals. When the signal is smooth, with local scale $n^{-3/2}$ at ϑ , we have local asymptotic normality (LAN) in the sense of Le Cam (1969). When the signal has a finite number of discontinuities, with local scale n^{-2} at ϑ , we obtain a limit experiment of different type, studied by Ibragimov and Khasminskii (1981), where smoothness of the parametrization (in the sense of Hellinger distance) is Hölder $\frac{1}{2}$.