ASYMPTOTIC EXPANSION FORMULAS FOR FUNCTIONALS OF ϵ-MARKOV PROCESSES WITH A MIXING PROPERTY

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Abstract. The ϵ-Markov process is a general model of stochastic processes which includes nonlinear time series models, diffusion processes with jumps, and many point processes. With a view to applications to the higher-order statistical inference, we will consider a functional of the ϵ-Markov process admitting a stochastic expansion. Arbitrary order asymptotic expansion of the distribution will be presented under a strong mixing condition. Applying these results, the third order asymptotic expansion of the M-estimator for a general stochastic process will be derived. The Malliavin calculus plays an essential role in this article. We illustrate how to make the Malliavin operator in several concrete examples. We will also show that the third-order expansion formula (Sakamoto and Yoshida (1998, ISM Cooperative Research Report, No. 107, 53–60; 1999, unpublished)) of the maximum likelihood estimator for a diffusion process can be obtained as an example of our result.

Key words and phrases: Asymptotic expansion, ϵ-Markov process, geometric mixing, M-estimator.