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Third-order asymptotic expansion of M-estimators for diffusion processes

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Abstract For an unknown parameter in the drift function of a diffusion process, we consider an M-estimator based on continuously observed data, and obtain its distributional asymptotic expansion up to the third order. Our setting covers the misspecified cases. To represent the coefficients in the asymptotic expansion, we derive some formulas for asymptotic cumulants of stochastic integrals, which are widely applicable to many other problems. Furthermore, asymptotic properties of cumulants of mixing processes will be also studied in a general setting.

Keywords Asymptotic expansion · M-estimator · Diffusion process