Asymptotic expansion for a filtering problem and a short term rate model

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Abstract. We study the filtering problem in which a system process $X_t(\varepsilon)$ and a observing process $Y_t(\varepsilon)$ depend on the parameter ε, and $X_t(\varepsilon)$ converges to a deterministic function $X_t(0)$ as $\varepsilon \downarrow 0$. We give an asymptotic expansion formula in L^p for the conditional expectation of a function of $X_t(\varepsilon)$ under the σ-field generated by the process $Y_s(\varepsilon)$, $0 \le s \le t$.