Abstract of Main Thesis

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Volatility estimation for diffusion type processes and related topics

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The availability of high frequency data on financial markets has motivated a lot of researchers to study the estimation of volatility. While there are a huge number of publications devoted to measurement of integrated volatility, the estimation of spot volatility has not received an adequate attention even though it is very important in practice. This thesis aims to fill that gap.

In the first chapter we present the background of our research.

In Chapter 2 we construct a real-time estimation scheme for the spot cross volatility of jump diffusion processes by using a threshold technique. The framework also contains the volatility estimation problem as a special case. We will show that our scheme works under very mild assumptions on the activity of the jump processes.

In Chapter 3 we introduce a class of statistics for the functional estimation of the spot volatility in the setting of frequently observed diffusion processes which may be disturbed by microstructure noise. We show that the limit theorems for the estimation of the spot volatility and the cross spot volatility of the statistics are still valid even if we add jump processes of finite or infinite activity to the underlying diffusion process.

An important application of the spot volatility estimators mentioned above is the construction of a parametric estimation for non-ergodic discretely sampled stochastic processes with jumps. In Chapter 4 we introduce a new approach called spot volatility estimator-based method to estimate the parameter of diffusion coefficients. This approach can work even when the sample is contaminated by microstructure noise. When the dynamics of underlying processes are known, we present another estimator by using a moment-based method.

Finally in Chapter 5 we study the discrete approximation of occupation time of diffusion processes. Our main concern is the rates of convergence of the estimators which are $n^{-3/4}$ and $n^{-1/2}$ for the case of deterministic corridor and stochastic corridor, respectively.