

浙江大学---复旦大学概率统计联合讨论班

时间：2018年12月22日

地点：复旦大学光华东主楼 1501

上午 主持人：应坚刚 复旦大学

10:00-11:00 吴波 复旦大学

题目：Functional Inequality, Stochastic Heat Equation and Ricci Flow

11:15-12:00 薛晓峰 北京交通大学

题目：Applications of linear systems in giving upper bounds of the critical value of the contact process

下午 主持人：苏中根 浙江大学

14:00-14:45 李利平 中科院

题目：On countably skew Brownian motions

15:00-15:45 吕昊俊 上海财经大学

题目：Option pricing under the 4/2 stochastic volatility model with double exponential jumps and stochastic interest rates

Functional Inequality, Stochastic Heat Equation and Ricci Flow

吴 波

Functional Inequality, Stochastic Heat Equation and Ricci Flow in a Riemannian manifold are three important directions in Mathematical research. In this talk, we will first introduce the recent development of functional inequalities on path space over a Riemannian manifold. Next, we will discuss the stochastic heat equations in a manifold and related results. Finally, the close connection between functional inequality and stochastic heat equation and Ricci flow will be discussed.

Applications of linear systems in giving upper bounds of the critical value of the contact process

薛 晓 锋

A linear system on a graph G is a continuous-time Markov process $\{\eta_t\}_{t \geq 0}$ with state space $[0, +\infty)^G$ that η_t flips to $A\eta_t$ at each jumping moment t for some random $G \times G$ matrix A while $\frac{d}{dt}\eta_t = B\eta_t$ for a deterministic $G \times G$ matrix B for t between adjacent jumping moments. Since 1980s, linear systems are utilized in the research of giving upper bounds of the critical value for the contact process. In this talk we will review some related results, including our works about 3D basic contact process and high-dimensional two-stage contact processes.

On countably skew Brownian motions

李利平

In this talk, we shall introduce and study the so-called countably skew Brownian motion. It is an extension of the well-known skew Brownian motion. Our argument is based on the theory of Dirichlet forms and it will also link this diffusion process with a singular SDE with the drift term of a sum of countable symmetric semi-martingale local times.

Option pricing under the 4/2 stochastic volatility model with double exponential jumps and stochastic interest rates

吕昊俊

In this talk, we propose a new hybrid stock model, that is 4/2 stochastic volatility model with double exponential jumps and stochastic interest rates. The stochastic volatility part is a combination of the Heston model and the 3/2 model. We derive the explicit expressions for the joint Fourier transform of the interest rate and the log-stock price. Closed-form solutions for European call option prices are derived by applying the inverse Fourier transform. Compared to the Monte Carlo simulation pricing method, our Fourier inversion method is more accurate and efficient thus can be used for estimation and calibration. In the empirical analysis, we estimate the risk-neutral parameters of the model in

calibration to both S&P 500 index and option prices. We then evaluate the contribution of stochastic interest rate and jumps in improving the pricing performance. Numerical results demonstrate that our model can fit the SPX prices and make prediction well. We also evaluate its improvement in pricing options with longer maturity. Furthermore, we use the model to examine the effects of jumps and interest rate variability on option values.