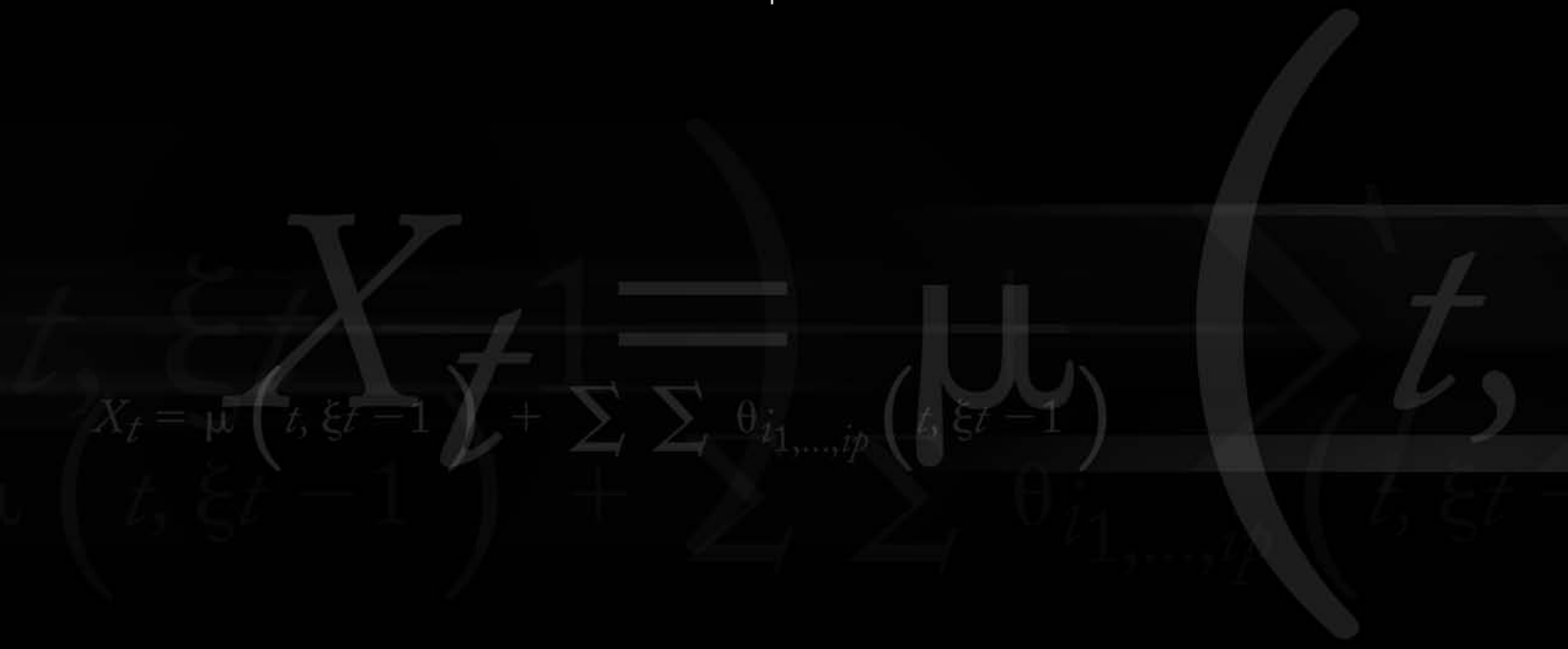
DEPARTMENT OF MATHEMATICS

SPA

STOCHASTIC PROCESSES AND THEIR APPLICATIONS

32ND CONFERENCE | AUGUST 6–10, 2007



UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Welcome to the 32nd Conference on *Stochastic Processes and Their Applications* on the campus of the University of Illinois at Urbana-Champaign! The Department of Mathematics, in Altgeld Hall, will be your host from August 6 to 10, 2007.

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Special Sessions Schedule

Abstract Number given in ( ) after Author's Name

8.6.07 | MONDAY

Special Session I

SLE and Related Processes 245AH

2:00–2:25 PM Lawler (960)
2:30–2:55 PM Bauer (469)
3:00–3:25 PM Kozdron (891)

Path Properties of Levy Processes 1 241AH

2:00–2:25 PM Schilling (422)
2:30–2:55 PM Rivero (47)
3:00–3:25 PM Yang (740)

Stochastic Equations 1 243AH

2:00–2:25 PM Mueller (783)
2:30–2:55 PM Viens (609)
3:00–3:25 PM Kurtz (587)

Special Session II

Potential Theory for Jump Processes 1 241AH

4:00–4:25 PM Vondracek (622)
4:30–4:55 PM Panki Kim (395)
5:00–5:25 PM Mendez (512)

Stochastic Equations 2 243AH

4:00–4:25 PM Ma (134)
4:30–4:55 PM Sundar (278)

8.7.07 | TUESDAY

Special Session I

Stochastic Equations 3 241AH

2:00–2:25 PM Cherny (377)
2:30–2:55 PM Wolf (355)
3:00–3:25 PM Engelbert (399)

Path Properties of Levy Processes 2 243AH

2:00–2:25 PM Chaumont (723)
2:30–2:55 PM Caballero (641)

Stochastic Models for Market Microstructure 143AH

2:00–2:25 PM Cotar (310)
2:30–2:55 PM Hayashi (698)
3:00–3:25 PM Viarengo (490)

Special Session II

Probability & Navier Stokes Equations 1 241AH

4:00–4:25 PM Iyer (758)
4:30–4:55 PM Ossiander (150)
5:00–5:25 PM Orum (898)
5:30–5:55 PM Bessaih (590)

SPDE's & Gaussian Analysis 243AH

4:00–4:25 PM Xiao (990)
4:30–4:55 PM Dongsheng Wu (249)
5:00–5:25 PM Viens (79)
5:30–5:55 PM Foondun (423)

Geometry and Probability 245AH

4:00–4:25 PM Cecil (100)
4:30–4:55 PM Gordina (914)
5:00–5:25 PM Baudoin (303)
5:30–5:55 PM Lescot (485)

461 The Set-Indexed Fractional Brownian Motion along Increasing Paths

Erick Herbin, Dassault Aviation, France

The set-indexed fractional Brownian motion (sifBm) has been defined by E. Herbin and E. Merzbach in 2006, for indices in a collection of compact subsets of a locally compact metric space equipped with a Radon measure. Its properties of stationarity and self-similarity have been discussed. In particular, it has been proved that the projection of a sifBm on an increasing path is a one-parameter time changed fractional motion. In this talk, we show the converse.

If X is a L^2-monotone outer-continuous set-indexed process such that its projection X^f on any elementary flow f is a time-changed one-parameter fractional Brownian motion, then X is a set-indexed fractional Brownian motion.

467 Optimal Buffer Size and Dynamic Rate Control for a Queueing Network with Reneging in Heavy Traffic

Arka Ghosh, Statistics, Iowa State University

We address a rate control problem associated with a single server finite-buffer Markovian queueing system with customer abandonment in heavy traffic. The controller can choose and fix a buffer size of the queue and can dynamically control the arrival and/or the service rates depending on the current state of the network. We consider the infinite horizon discounted cost criterion, where the cost function includes a penalty for each rejected customers, a control cost related to the adjustment of the arrival and service rates as well as a penalty for each abandoned customer. Here we obtain an explicit solution of the approximating diffusion control problem (Brownian control problem or BCP) and using this solution, construct controls for the queueing network control problem. We also prove asymptotic optimality of this policy, using generalized regulator maps (Skorohod maps) and weak convergence techniques. In addition, we identify the parameter regimes where infinite buffer size is optimal.

469 Asymptotics for Restriction Measures in Thin Annuli

Robert Bauer, Mathematics, University of Illinois at Urbana-Champaign

We use conformal maps to obtain explicit upper and lower bounds for the probability that a chordal restriction measure in the unit disk does not enter the disk of radius 1-r, and then find the exponential rate at which this probability decays to zero as r tends to 0.

476 Superfast Coupling and Rapid Mixing

Yevgeniy Kovchegov, Mathematics, Oregon State University

We will discuss recent developements in coupling methods and mixing times. We will go through some of the new, often non-Markovian approaches to coupling and applications, showing rapid mixing. This presentation is based on joint work with R.Burton.

485 Structure of the Virasoro Algebra and Ricci Curvature of the Kirillov Space

Paul Lescot, INSSET, Université de Picardie, France

Kirillovs construction provides a canonical identification between the homogeneous space Diff(S1)/Rot(S1) and a certain space of univalent functions on the unit disk. This space carries a canonical Kâhlerian structure, and the associated Ricci curvature tensor has been determined in our joint work with M. Gordina (JFA, 2006). We shall try to clarify the computations involved in these constructions; it turns out that they are intimately related to purely algebraic properties of the Virasoro algebra, the essentially unique central extension of the Lie algebra diff(S1) of Diff(S1).

490 The Two-Parameter Ewens Distribution: A Finitary Approach

Paolo Viarengo, Aerospatial Engineering, University of Naples “Federico II,” Italy

The new approaches to macroeconomic modelling that describe macroscopic variables in terms of the behaviour of a large collection of microeconomic entities, has often dealing with the problem of clustering of agents in the

market. Aoki and Yoshikawa define "cluster" any group of economic agents (a sector, an industry…) with the same choice or same set of attributes. What Dynamics emerges in the processes of formation and dissolution of clusters comprising interacting agents?

Clustering has often been described by Ewens Sampling Formula (ESF) which has been generalized recently by Pitman to two parameter, where the "weight" for the mutation probability depends on the number of existing clusters. In contrast with the usual complex derivations, we suggest a finitary characterization of the two-parameter ESF pointing to real economic processes. We derive some essential feature of the model without introducing notions like frequency spectrum, structure distribution or size-biased permutation invariance, that are difficult to apply to concrete finite populations. Our approach is finitary in the sense that we provide a probabilistic description of a system of n individuals considered as a closed system, a population, where individuals can change attributes over time. We suppose that the choice is probabilistic, the resulting accommodation probability being a generalization of the famous Ehrenfest-urn-scheme, with the great difference that the creation term is influenced by the results of all previous choices (Ehrenfest-Pitman scheme). The equilibrium probability is understood as the fraction of time the system spends in the considered partition. A finite model of economic interacting agents whose equilibrium aggregation state is described by the two-parameter Ewens distribution is presented. The exact marginal description of a site is derived, wherefrom birth, life and death of clusters is easy to extract.

512 Symmetrization of Levy Processes

Pedro Mendez, Mathematics, Universidad de Costa Rica

The purpose of this paper is to show that many of the isoperimetric —type results which have been well known for many years for the Laplacian and Brownian motion hold for very general Levy processes. In particular we will show generalizations of the Faber-Krahn theorem on eigenvalues, isoperimetric inequalities for heat kernels, Green functions, and exit times for Brownian motion.

517 Motion in a Random Force Field

Leonid Koralov, Department of Mathematics, University of Maryland

We consider the motion of a particle in a random isotropic force field. Assuming that the force field arises from a Poisson field in R^d, d >3, and the initial velocity of the particle is sufficiently large, we describe the asymptotic behavior of the particle.

520 Resonance in the Scalar Transport Equation under Periodic Shear-Flow and Boundary Noise

Vena Pearl Bongolan, Ellis College, New York Institute of Technology (Cardean Learning Group, Chicago); Jinqiao Duan and George Skountrianos, Department of Applied Mathematics, Illinois Institute of Technology, Chicago.

The time and space-averaged salinity of a gravity current evolving under an assumed sinusoidal shear-flow with noise in the boundary was previously observed to have high-amplitude oscillations for high-frequency shear-flows, regardless of the noise, with or without noise. The finding in this extended study is that it happens even for low-frequency shear flows, and various frequencies are being studied. These oscillations attain several relative maxima when plotted against the frequency, suggesting resonance. Specifically, decaying oscillations are observed. The most intriguing result is that, for currents evolving under colored Levy noise, the oscillations initially decay to a small, constant rate, then increase again.

Experiments on varying the variance of the noise (interpreted as its strength) are also being carried out. Levy colored noise is affected most by the increasing the variance, and it has the effect of hastening the initial damping observed above.

A new metric to measure the effect of boundary noise is also being developed. Preliminary results show that Wiener white and colored and Levy white noises all have the effect of a causing a linear increase in the averaged salinity, but Levy colored noise gives an initial increase in the salinity, followed by a continuous decrease.

525 A Strictly Stationary, 5-tuplewise Independent Counterexample to the Central Limit Theorem

Richard Bradley, Mathematics, Indiana University

A strictly stationary sequence of random variables is constructed with the following properties: The random variables each take just the values -1 and +1, with probability 1/2 each; every five of the random variables are independent; and for every infinite set Q of positive