

# JOURNAL OF APPLIED PROBABILITY

---

VOLUME 39

NUMBER 4

DECEMBER 2002



EDITOR-IN-CHIEF C. C. HEYDE

FOUNDING EDITOR (1964–1989) J. GANI

# JOURNAL OF APPLIED PROBABILITY

This is an international journal published by the Applied Probability Trust in association with the London Mathematical Society; it contains research papers and notes on applications of probability theory to the biological, physical, social and technological sciences. An annual volume of approximately 1200 pages is published in four issues appearing in March, June, September and December.

## EDITORIAL BOARD

*Editor-in-Chief* C. C. HEYDE (Columbia University and Australian National University)

*Coordinating Editors* N. H. BINGHAM (University of London)  
M. F. NEUTS (University of Arizona)

*Editors* R. J. ADLER (Technion, Haifa)  
A. J. BADDELEY (University of Western Australia)  
P. BRÉMAUD (ENS, Paris, and EPFL, Lausanne)  
C. CANNINGS (University of Sheffield)  
E. ÇINLAR (Princeton University)  
D. J. DALEY (Australian National University)  
P. J. DONNELLY (University of Oxford)  
P. EMBRECHTS (ETH, Zürich)  
A. HORDIJK (Universiteit Leiden)  
P. JAGERS (Chalmers University of Technology and Göteborgs Universitet)  
S. JANSON (Uppsala Universitet)  
G. KERSTING (Johann Wolfgang Goethe-Universität, Frankfurt am Main)  
J. F. C. KINGMAN (Isaac Newton Institute, Cambridge)  
C. KLÜPPELBERG (Technische Universität München)  
T. MIKOSCH (Københavns Universitet)  
S. I. RESNICK (Cornell University)  
L. C. G. ROGERS (University of Bath)  
J. L. TEUGELS (Katholieke Universiteit Leuven)  
D. VERE-JONES (Victoria University of Wellington)  
R. R. WEBER (University of Cambridge)  
W. WHITT (Columbia University)

## EDITORIAL OFFICE

*Executive Editor* L. J. NASH (University of Sheffield)

*Production Editor* D. A. CRUICKSHANK (University of Sheffield)

All correspondence relating to the submission of papers should be sent to: The Executive Editor, Applied Probability, School of Mathematics and Statistics, University of Sheffield, Sheffield S3 7RH, UK. Subscription rates and notes for contributors are to be found on the inside back cover.

## CECIL KING TRAVEL SCHOLARSHIP 2003

The Cecil King Memorial Foundation in 2001 established a Cecil King Travel Scholarship in Mathematics to the value of £5000, to be awarded annually to a young mathematician of outstanding promise, to support a period of study or research abroad for a typical period of three months, to enhance his or her studies and further his or her career development. The Scholarship will normally be awarded to a UK or Irish National under the age of 25 years, either registered for or having recently completed a doctoral degree at a UK University.

The award will be competitive and based on a written proposal describing the intended programme of study or research abroad and the benefits to be gained from such a visit, a short presentation and an interview.

The award will be made by the Council of the London Mathematical Society on the nomination of the Cecil King Prize Committee, whose members will be nominated by the Society's Education Committee.

The initial application should include:

1. A completed application form.
2. A short proposal (4 pages maximum) indicating the proposed programme of study abroad, the benefit of such an opportunity in advancing the candidate's studies, and an indication of the Institute that the candidate wishes to visit.
3. A letter of support from the Head of their Department, or from their Research Supervisor.

The initial applications will then be considered by the Cecil King Prize Committee, which will select up to six candidates for interview. Selected candidates will be asked to approach the intended research institution or research leader to be visited, to confirm that a visit would indeed be welcomed if an award were made. They will then be invited to make a brief presentation to the Cecil King Prize Committee on their proposed research and the benefits to be gained from the visit abroad.

Final ratification of the award will require formal confirmation from the institution/person to be visited, indicating their willingness to welcome the visit and to provide whatever supervision and research facilities might be needed. Any supervision or other fees will be paid from the Prize.

At the end of the visit, the student will be expected to write a short report to the Cecil King Memorial Foundation, indicating the activities and benefits gained from the visit.

Application forms may be obtained from the Executive Secretary, The London Mathematical Society, De Morgan House, 57–58 Russell Square, London WC1B 4HS (email: [lms@lms.ac.uk](mailto:lms@lms.ac.uk)) or from the Society's website ([http://www.lms.ac.uk/activities/prizes\\_com/](http://www.lms.ac.uk/activities/prizes_com/)). The closing date for applications is Friday 7 February 2003. It is hoped that the Scholarship will be awarded before the end of March 2003.

Volume 39 Number 1

*Research Papers*

- 1 MASATO SHINODA. Existence of phase transition of percolation on Sierpiński carpet lattices  
11 B. KLAR. A note on the  $\mathcal{L}$ -class of life distributions  
20 MARK E. LEWIS, HAYRIYE AYHAN AND ROBERT D. FOLEY. Bias optimal admission control policies for a multiclass nonstationary queueing system  
38 PAUL FEARNHEAD. The common ancestor at a nonneutral locus  
55 XIN GUO. Some risk management problems for firms with internal competition and debt  
70 JAMES C. FU AND Y. M. CHANG. On probability generating functions for waiting time distributions of compound patterns in a sequence of multistate trials  
81 EUGENE SENETA AND JOHN TUHAO CHEN. On explicit and Fréchet-optimal lower bounds  
91 PETER EICHELSBACHER AND AYALVADI GANESH. Bayesian inference for Markov chains  
100 NARN-RUEIH SHIEH AND S. JAMES TAYLOR. Multifractal spectra of branching measure on a Galton–Watson tree  
112 CLAUDIA CECI AND ANNA GERARDI. Conditional law of a branching process observing a subpopulation  
123 P. BRÉMAUD, G. NAPPO AND G. L. TORRISI. Rate of convergence to equilibrium of marked Hawkes processes  
137 G. L. TORRISI. A class of interacting marked point processes: rate of convergence to equilibrium  
161 FRED RICHMAN AND KATARZYNA WINKOWSKA-NOWAK. Computing limiting stationary distributions of small noisy networks  
179 F. BALL, R. K. MILNE AND G. F. YEO. Multivariate semi-Markov analysis of burst properties of multiconductance single ion channels  
197 F. JAVIER LÓPEZ AND GERARDO SANZ. Markovian couplings staying in arbitrary subsets of the state space  
213 B. VAN HOUTDT AND C. BLONDIA. The delay distribution of a type  $k$  customer in a first-come-first-served MMAP[ $K$ ]/PH[ $K$ ]/1 queue

*Short Communications*

- 224 TAIZHONG HU AND HUILIANG XIE. Proofs of the closure property of NBUC and NBU(2) under convolution  
228 J. PREATER. On the severity of  $M/M/\infty$  congested episodes  
231 Correction

Volume 39 Number 2

*Research Papers*

- 233 XIANPING GUO AND WEIPING ZHU. Denumerable-state continuous-time Markov decision processes with unbounded transition and reward rates under the discounted criterion
- 251 OLIVIER BONIN. Large deviation theorems for weighted sums applied to a geographical problem
- 261 BOGDAN KRZYSZTOF MUCIEK. Optimal stopping of a risk process: model with interest rates
- 271 SHOOU-REN HSIAU AND JIING-RU YANG. Selecting the last success in Markov-dependent trials
- 282 MYKOLA BRATIYCHUK. Remarks on the absolute maximum of a Lévy process
- 296 JIE MI. Age-replacement policy and optimal work size
- 312 JUN CAI. Ruin probabilities with dependent rates of interest
- 324 GORDON E. WILLMOT. On higher-order properties of compound geometric distributions
- 341 V. G. KULKARNI AND K. D. GLAZEBROOK. Output analysis of a single-buffer multiclass queue: FCFS service
- 359 N. BARBOT AND B. SERICOLA. Stationary solution to the fluid queue fed by an M/M/1 queue
- 370 CHUNSHENG MA. Correlation models with long-range dependence

*Short Communications*

- 383 GUILLERMO TOMÁS TETZLAFF. Breakage and restoration in recursive trees
- 391 VICKY HENDERSON AND RAFAŁ WOJAKOWSKI. On the equivalence of floating- and fixed-strike Asian options
- 395 PETER JAGERS AND LU ZHUNWEI. Branching processes with deteriorating random environments
- 402 RONALD W. WOLFF AND CHIA-LI WANG. On the convexity of loss probabilities
- 407 M. J. LOPEZ-HERRERO. Distribution of the number of customers served in an M/G/1 retrial queue
- 413 OFFER KELLA AND WOLFGANG STADJE. Markov-modulated linear fluid networks with Markov additive input
- 421 FRANCO PELLEREY AND PATRIZIA SEMERARO. Ageing and stochastic comparisons for a covariate failure model
- 426 XIAOHU LI AND MING J. ZUO. On behaviour of some new ageing properties based upon the residual life of  $k$ -out-of- $n$  systems
- 434 ANTONIO DI CRESCENZO AND MARIA LONGOBARDI. Entropy-based measure of uncertainty in past lifetime distributions
- 441 Obituary: Richard Lewis Tweedie

Volume 39 Number 3

*Research Papers*

- 455 J. F. C. KINGMAN. Stochastic aspects of Lanchester's theory of warfare
- 466 AIDAN SUDBURY. Inclusion–exclusion methods for treating annihilating and deposition processes
- 479 M. MOLINA, M. MOTA AND A. RAMOS. Bisexual Galton–Watson branching process with population-size-dependent mating
- 491 JIE MI. On bounds for some optimal policies in reliability
- 503 ATTAHIRU SULE ALFA AND I. T. CASTRO. Discrete-time analysis of a repairable machine
- 517 CHUNSHENG ZHANG AND RONG WU. Total duration of negative surplus for the compound Poisson process that is perturbed by diffusion
- 533 BRUNO BASSAN, SUBHASH KOCHAR AND FABIO SPIZZICHINO. Some bivariate notions of IFR and DMRL and related properties
- 545 GWO DONG LIN AND JORDAN STOYANOV. On the moment determinacy of the distributions of compound geometric sums
- 555 PHILIP J. BOLAND, HARSHINDER SINGH AND BOJAN CUKIC. Stochastic orders in partition and random testing of software
- 566 SERGE GUILLAS. Doubly stochastic Hilbertian processes
- 581 N. R. MOHAN AND S. RAVI. Some properties of two families of classes of life distributions
- 590 TIJS HUISMAN AND RICHARD J. BOUCHERIE. The sojourn time distribution in an infinite server resequencing queue with dependent interarrival and service times
- 604 MASAKIYO MIYAZAWA AND HIROYUKI TAKADA. A matrix exponential form for hitting probabilities and its application to a Markov-modulated fluid queue with downward jumps
- 619 GANG UK HWANG, BONG DAE CHOI AND JAE-KYOON KIM. The waiting time analysis of a discrete-time queue with arrivals as a discrete autoregressive process of order 1

*Short Communications*

- 630 EROL A. PEKÖZ AND NITINDRA JOGLEKAR. Poisson traffic flow in a general feedback queue
- 637 FELÍX BELZUNCE AND JOSÉ-MARÍA RUIZ. Multivariate dispersive ordering of epoch times of nonhomogeneous Poisson processes
- 644 VLADIMIR V. MAZALOV AND VESA SAARIO. The house-selling problem with reward rate criterion
- 650 LUDWIG BARINGHAUS AND RUDOLF GRÜBEL. From matchbox to bottle: a storage problem
- 657 ANTONIO MURCIANO, JAVIER ZAMORA, JESUS LOPEZ-SANCHEZ AND EMILIA RODRIGUEZ-SANTAMARIA. Probability distribution of the number of deceptions in collective robotics
- 664 Obituary: Maurice Stevenson Bartlett

Volume 39 Number 4

*Research Papers*

- 671 KRISHANU MAULIK, SIDNEY RESNICK AND HOLGER ROOTZÉN. Asymptotic independence and a network traffic model
- 700 PETER C. KIESSLER, GEORGIA-ANN KLUTKE AND YOONJUNG YANG. Availability of periodically inspected systems subject to Markovian degradation
- 712 JENNIE C. HANSEN AND JERZY JAWORSKI. Compound random mappings
- 730 V. V. ANH, C. C. HEYDE AND N. N. LEONENKO. Dynamic models of long-memory processes driven by Lévy noise
- 748 JAN PEDERSEN. Periodic Ornstein–Uhlenbeck processes driven by Lévy processes
- 764 MATTHEW A. CARLTON. A family of densities derived from the three-parameter Dirichlet process
- 775 CHRISTIAN COMMAULT AND STÉPHANE MOCANU. A generic property of phase-type representations
- 786 ANYUE CHEN. Ergodicity and stability of generalised Markov branching processes with resurrection
- 804 M. GONZÁLEZ, M. MOLINA AND I. DEL PUERTO. On the class of controlled branching processes with random control functions
- 816 F. C. KLEBANER AND S. SAGITOV. The age of a Galton–Watson population with a geometric offspring distribution
- 829 WEN-MING HONG. Moderate deviation for super-Brownian motion with super-Brownian immigration
- 839 YONG-HUA MAO. Strong ergodicity for Markov processes by coupling methods
- 853 JEAN-MARIE GARCIA, OLIVIER BRUN AND DAVID GAUCHARD. Transient analytical solution of  $M/D/1/N$  queues
- 865 HANS DADUNA AND RYSZARD SZEKLI. Conditional job-observer property for multitype closed queueing networks

*Short Communications*

- 882 C. C. HEYDE. On modes of long-range dependence
- 889 K. BOROVKOV AND A. NOVIKOV. On a new approach to calculating expectations for option pricing
- 896 TSUYOSHI KATAYAMA. A note on level-crossing analysis for the excess, age, and spread distributions
- 901 P. K. POLLETT AND V. T. STEFANOV. Path integrals for continuous-time Markov chains
- 905 RONALD W. WOLFF. Losses per cycle in a single-server queue
- 910 Index