

THE ANNALS of PROBABILITY

AN OFFICIAL JOURNAL OF THE
INSTITUTE OF MATHEMATICAL STATISTICS

Special Invited Paper

- The stochastic random-cluster process and the uniqueness of random-cluster measures GEOFFREY GRIMMETT 1461

Articles

- Asymptotic shapes for stationary first passage percolation
OLLE HÄGGSTRÖM AND RONALD MEESTER 1511
- The "true" self-avoiding walk with bond repulsion on \mathbb{Z} : Limit theorems BÁLINT TÓTH 1523
- Geometric and symmetry properties of a nondegenerate diffusion process
M. COHEN DE LARA 1557
- Some new classes of exceptional times of linear Brownian motion
SANJAR ASPANDIAROV AND JEAN-FRANÇOIS LE GALL 1605
- Iterated law of iterated logarithm KRZYSZTOF BURDZY AND JAIME SAN MARTÍN 1627
- Exact asymptotics for the probability of exit from a domain and applications to simulation PAOLO BALDI 1644
- Exponential and uniform ergodicity of Markov processes
D. DOWN, S. P. MEYN AND R. L. TWEEDIE 1671
- The support of measure-valued branching processes in a random environment
D. DAWSON, Y. LI AND C. MUELLER 1692
- The Hausdorff measure of the support of two-dimensional super-Brownian motion
JEAN-FRANÇOIS LE GALL AND EDWIN A. PERKINS 1719
- On the large time growth rate of the support of supercritical super-Brownian motion ROSS G. PINSKY 1748
- Large deviations for the three-dimensional super-Brownian motion
TZONG-YOW LEE AND BRUNO REMILLARD 1755
- Explicit stochastic integral representations for historical functionals
STEVEN N. EVANS AND EDWIN A. PERKINS 1772
- Quantum operators in classical probability theory: II. The concept of duality in interacting particle systems AIDAN SUDBURY AND PETER LLOYD 1816
- Hydrodynamic scaling limits with deterministic initial configurations SHENGLIN LU 1831
- Intermittency-type estimates for some nondegenerate SPDE's RICHARD B. SOWERS 1853
- Smooth densities for degenerate stochastic delay equations with hereditary drift
DENIS R. BELL AND SALAH-ELDIN A. MOHAMMED 1875
- Uniqueness and robustness of solution of measure-valued equations of nonlinear filtering A. G. BHATT, G. KALLIANPUR AND R. L. KARANDIKAR 1895
- Random walks on the groups of upper triangular matrices RICHARD STONG 1939
- Eigenvalues of the natural random walk on the Burnside group $B(3, n)$
RICHARD STONG 1950
- Eigenvalues of random walks on groups. RICHARD STONG 1961
- Optimal switching between two random walks R. CAIROLI AND ROBERT C. DALANG 1982
- A probabilistic formula for the concave hull of a function. ROBERT J. VANDERBEI 2014
- L^p -boundedness of the overshoot in multidimensional renewal theory
PHILIP S. GRIFFIN AND TERRY MCCONNELL 2022

Correction

- Divergence of shape fluctuations in two dimensions
CHARLES M. NEWMAN AND MARCELO S. T. PIZA 2057

Vol. 23, No. 4—October 1995

INSTITUTE OF MATHEMATICAL STATISTICS

(Organized September 12, 1935)

The purpose of the Institute is to foster the development and dissemination of the theory and applications of statistics and probability.

OFFICERS AND EDITORS

- President:** James O. Berger, Department of Statistics, Purdue University, West Lafayette, Indiana 47907-1399
- President-Elect:** Nancy Reid, Department of Statistics, University of Toronto, 100 St. George Street, Toronto, Ontario M5S 1A1, Canada
- Past President:** David R. Brillinger, Department of Statistics, University of California, Berkeley, California 94720-0001
- Executive Secretary:** Hari G. Mukerjee, Department of Mathematics and Statistics, Wichita State University, Wichita, Kansas 67208-0033
- Treasurer:** Miriam Gasko Donoho, Department of Marketing and Quantitative Studies, College of Business, San Jose State University, 1 Washington Square, San Jose, California 95192-0069
- Program Secretary:** Jon A. Wellner, Department of Statistics GN-22, University of Washington, Seattle, Washington 98195
- Editors, *The Annals of Statistics*:** Lawrence D. Brown, Department of Statistics, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6302; John Rice, Department of Statistics, Evans Hall, University of California, Berkeley, California 94720
- Editor, *The Annals of Probability*:** James W. Pitman, Department of Statistics, University of California, Berkeley, California 94720-0001
- Editor, *The Annals of Applied Probability*:** Richard L. Tweedie, Department of Statistics, Colorado State University, Fort Collins, Colorado 80523
- Executive Editor, *Statistical Science*:** Paul Switzer, Department of Statistics, Sequoia Hall, Stanford University, Stanford, California 94305
- Editor, *The IMS Bulletin*:** Susan R. Wilson, Centre for Mathematics and its Applications, School of Mathematical Sciences, Australian National University, Canberra ACT 0200, Australia
- Editor, *IMS Lecture Notes—Monograph Series*:** David Ruppert, School of Operations Research and Industrial Engineering, E & TC Building, Cornell University, Ithaca, New York 14853-7501
- Managing Editor:** Saul Blumenthal, Department of Statistics, Ohio State University, 1958 Neil Avenue, Columbus, Ohio 43210-1247
- Managing Editor:** Paul J. Smith, Director, Statistics Laboratory, Department of Mathematics, University of Maryland, College Park, Maryland 20742

Journals. The scientific journals of the Institute are *The Annals of Applied Probability*, *The Annals of Probability*, *The Annals of Statistics* and *Statistical Science*. The news organ of the Institute is *The Institute of Mathematical Statistics Bulletin*.

Individual and Organizational Memberships. All individual members pay basic membership dues of \$60. Each individual member must elect to receive at least one scientific journal for an additional amount, as follows: *The Annals of Applied Probability* (\$20), *The Annals of Probability* (\$25), *The Annals of Statistics* (\$30) or *Statistical Science* (\$15). Of the total due dues paid, \$29 is allocated to *The IMS Bulletin* and the remaining amount is allocated equally among the scientific journal(s) received. Reduced membership dues are available to full-time students, permanent residents of countries designated by the IMS Council and retired members. Retired members may elect to receive the *Bulletin* only for \$24. Organizational memberships are available to nonprofit organizations at \$450 per year and to for-profit organizations at \$750 per year. Organizational memberships include two multiple-readership copies of all IMS journals in addition to other benefits specified for each category (details available from the IMS Business Office).

Individual and General Subscriptions. Subscriptions are available on a calendar-year basis. Individual subscriptions are for the personal use of the subscriber and must be in the name of, paid directly by, and mailed to an individual. Individual subscriptions for 1996 are available to *The Annals of Applied Probability* (\$85), *The Annals of Probability* (\$90), *The Annals of Statistics* (\$95), *The IMS Bulletin* (\$50) and *Statistical Science* (\$75). General subscriptions are for libraries, institutions and any multiple-readership use. General subscriptions for 1996 are available to *The Annals of Applied Probability* (\$100), *The Annals of Probability* (\$150), *The Annals of Statistics* (\$170), *The IMS Bulletin* (\$50) and *Statistical Science* (\$80). Air mail rates for delivery outside North America are \$80 per title (excluding *The IMS Bulletin*).

Permissions policy. Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by the Institute of Mathematical Statistics, provided that the base fee of \$5.00 per copy, plus \$0.00 per page is paid directly to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, Massachusetts 01923. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is 1050-5164/96 \$5.00 + 0.00.

Correspondence. Mail concerning membership, subscriptions, nonreceipt claims, copyright permissions, advertising or back issues should be sent to the IMS Business Office. Mail concerning submissions or editorial content should be sent to the Editor of the appropriate journal. Their addresses are listed above. Mail concerning the production of this journal should be sent to: Patrick Kelly, IMS Production Editor, Department of Statistics, 3000 Steinberg-Dietrich Hall, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6302.

***The Annals of Probability* (ISSN 0091-1798)**, Volume 24, Number 4, October 1996. Published quarterly by the Institute of Mathematical Statistics, 3401 Investment Boulevard #7, Hayward, California 94545-3819-18. Periodicals postage paid at Hayward, California, and at additional mailing offices. **POSTMASTER:** Send address changes to *The Annals of Probability*, Institute of Mathematical Statistics, 3401 Investment Boulevard #7, Hayward, California 94545-3819-18.

EDITORIAL STAFF

EDITOR

JIM PITMAN

ASSOCIATE EDITORS

DAVID ALDOUS
KENNETH S. ALEXANDER
RODRIGO BAÑUELOS
JEAN BRETAGNOLLE
J. THEODORE COX
AMIR DEMBO
STEVEN N. EVANS
PATRICK J. FITZSIMMONS

TADAHISHA FUNAKI
EVARIST GINÉ
FRANK B. KNIGHT
STEVEN P. LALLEY
GREGORY F. LAWLER
MICHEL LEDOUX
TERRY LYONS

MICHAEL B. MARCUS
TERRY R. MCCONNELL
ETIENNE PARDOUX
LAURENT SALOFF-COSTE
ROBERTO H. SCHONMANN
SHINZO WATANABE
RUTH J. WILLIAMS
MARC YOR

BOOK REVIEWS

SANDY ZABELL

EDITORIAL ASSISTANT

MYRNA L. HUTCHERSON

MANAGING EDITOR

PAUL J. SMITH

PRODUCTION EDITOR

LINDA A. PRATT

PAST EDITORS

THE ANNALS OF MATHEMATICAL STATISTICS

H. C. CARVER, 1930–1938
S. S. WILKS, 1938–1949
T. W. ANDERSON, 1950–1952
E. L. LEHMANN, 1953–1955
T. E. HARRIS, 1955–1958

WILLIAM KRUSKAL, 1958–1961
J. L. HODGES, JR., 1961–1964
D. L. BURKHOLDER, 1964–1967
Z. W. BIRNBAUM, 1967–1970
INGRAM OLKIN, 1970–1972

THE ANNALS OF PROBABILITY

RONALD PYKE, 1972–1975
PATRICK BILLINGSLEY, 1976–1978
R. M. DUDLEY, 1979–1981
HARRY KESTEN, 1982–1984

THOMAS M. LIGGETT, 1985–1987
PETER NEY, 1988–1990
BURGESS DAVIS, 1991–1993

EDITORIAL POLICY

The main purpose of *The Annals of Probability* and *The Annals of Statistics* is to publish contributions to the theory of probability and statistics and to their applications. The emphasis is on importance and interest; formal novelty and mathematical correctness alone are not sufficient. Also appropriate are authoritative expository papers and surveys of areas in vigorous development. All papers are refereed.

NOTICE

Manuscripts submitted for publication in *The Annals of Probability* should be sent to the Editor at the following address:

Jim Pitman
Department of Statistics
367 Evans Hall #3860
University of California
Berkeley, California 94720-3860

IMS CORPORATE MEMBERS

AT & T BELL LABORATORIES
Murray Hill, New Jersey

GENERAL MOTORS CORPORATION
Research Laboratories
Warren, Michigan

BELL COMMUNICATIONS RESEARCH
Morristown, New Jersey

INTERNATIONAL BUSINESS MACHINES CORP
Thomas J. Watson Research Center
Yorktown Heights, New York

IMS INSTITUTIONAL MEMBERS

ABERDEEN UNIVERSITY
Queen Mother Library
Aberdeen, Scotland

ACADEMIA SINICA
Inst of Statistical Science
Taipei, Taiwan

AMERICAN UNIVERSITY
Dept of Mathematics and Statistics
Washington, DC

ARIZONA STATE UNIVERSITY
Committee on Statistics
Dept of Mathematics and Dept of
Decision and Information Systems
Tempe, Arizona

AUSTRALIAN NATIONAL UNIVERSITY
Canberra, ACT, Australia

BOWLING GREEN STATE UNIVERSITY
Dept of Mathematics and Statistics
Bowling Green, Ohio

CALIFORNIA STATE UNIVERSITY
AT FULLERTON
Dept of Mathematics
Fullerton, California

CASE WESTERN RESERVE UNIVERSITY
Dept of Mathematics and Statistics
Cleveland, Ohio

CORNELL UNIVERSITY
Dept of Mathematics
Ithaca, New York

DALHOUSIE UNIVERSITY
Killam Memorial Library
Halifax, Nova Scotia, Canada

DUKE UNIVERSITY
Mathematics and Physics Library
Durham, North Carolina

FLORIDA STATE UNIVERSITY
Dept of Statistics
Tallahassee, Florida

FRONTIER SCIENCE
Brookline, Massachusetts

GEORGE WASHINGTON UNIVERSITY
Dept of Statistics
Washington, DC

HARVARD UNIVERSITY
Cabot Science Library
Cambridge, Massachusetts

HARVARD UNIVERSITY
Dept of Biostatistics
Boston, Massachusetts

HARVARD UNIVERSITY
Dept of Statistics
Cambridge, Massachusetts

HONG KONG POLYTECHNIC UNIVERSITY
Dept of Applied Mathematics
Hung Hom Kowloon, Hong Kong

INDIAN STATISTICAL INSTITUTE
Library
Calcutta, India

INDIANA UNIVERSITY
Dept of Mathematics
Bloomington, Indiana

INSTITUTE FOR DEFENSE ANALYSIS
Center for Communications Research
La Jolla, California

IOWA STATE UNIVERSITY
Dept of Stat and Statistical Lab
Ames, Iowa

JOHNS HOPKINS UNIVERSITY
Depts of Biostatistics
and Mathematical Sciences
Baltimore, Maryland

KANSAS STATE UNIVERSITY
Dept of Statistics
Manhattan, Kansas

MARA INSTITUTE OF TECHNOLOGY
Selangor, Malaysia

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Dept of Mathematics
Cambridge, Massachusetts

MEDICAL COLLEGE OF WISCONSIN
Biostatistics Division
Milwaukee, Wisconsin

MCGILL UNIVERSITY
Dept of Mathematics and Statistics
Montreal, Quebec, Canada

MEMORIAL SLOAN-KETTERING CANCER CENTER
Biostatistics Service
New York, New York

MIAMI UNIVERSITY LIBRARY
Oxford, Ohio

MICHIGAN STATE UNIVERSITY
Dept of Statistics and Probability
East Lansing, Michigan

NATIONAL SECURITY AGENCY
Fort George G. Meade, Maryland

NEW MEXICO STATE UNIVERSITY
Dept of Mathematical Sciences
Las Cruces, New Mexico

NORTH CAROLINA STATE UNIVERSITY
Dept of Statistics
Raleigh, North Carolina

NORTH DAKOTA STATE UNIVERSITY LIBRARY
Fargo, North Dakota

NORTHERN ILLINOIS UNIVERSITY
Div of Statistics
DeKalb, Illinois

OHIO STATE UNIVERSITY
Dept of Statistics
Columbus, Ohio

OREGON STATE UNIVERSITY
Dept of Statistics
Corvallis, Oregon

PENNSYLVANIA STATE UNIVERSITY
Dept of Statistics
University Park, Pennsylvania

PRINCETON UNIVERSITY LIBRARY
Princeton, New Jersey

PURDUE UNIVERSITY LIBRARY
West Lafayette, Indiana

QUEEN'S UNIVERSITY
Dept of Mathematics and Statistics
Kingston, Ontario, Canada

RICE UNIVERSITY LIBRARY
Houston, Texas

THE ROCKEFELLER UNIVERSITY LIBRARY
New York, New York

STANFORD UNIVERSITY
Dept of Statistics
Stanford, California

SOUTHERN ILLINOIS UNIVERSITY
Dept of Mathematics and Statistics
Edwardsville, Illinois

SOUTHERN METHODIST UNIVERSITY
Dept of Science
Dallas, Texas

SYRACUSE UNIVERSITY
Dept of Mathematics
Syracuse, New York

TECHNISCHE UNIVERSITÄT
 Inst für Math Stochastik
 Braunschweig, Germany

TEXAS TECH UNIVERSITY
 Dept of Mathematics
 Lubbock, Texas

UNIVERSITÄT KARLSRUHE
 Inst für Math Stochastik
 Karlsruhe, Germany

UNIVERSITÄTSBIBLIOTHEK DORTMUND
 Bereichsbibliothek Statistik
 Dortmund, Germany

UNIVERSITY OF ALBERTA
 Dept of Statistics
 and Applied Probability
 Edmonton, Alberta, Canada

UNIVERSITY OF ARIZONA
 Dept of Mathematics
 Tucson, Arizona

UNIVERSITY OF BATH
 Library
 Bath, United Kingdom

UNIVERSITY OF BRISTOL
 Queen's Library
 Bristol, United Kingdom

UNIVERSITY OF BRITISH COLUMBIA
 Dept of Statistics
 Vancouver, British Columbia, Canada

UNIVERSITY OF CALGARY
 Dept of Mathematics and Statistics
 Calgary, Alberta, Canada

UNIVERSITY OF CALIFORNIA, BERKELEY
 Dept of Statistics
 Berkeley, California

UNIVERSITY OF CALIFORNIA, DAVIS
 Div of Statistics
 Davis, California

UNIVERSITY OF CALIFORNIA, IRVINE
 Main Library
 Irvine, California

UNIVERSITY OF CONNECTICUT
 Dept of Statistics
 Storrs, Connecticut

UNIVERSITY OF FLORIDA
 Dept of Statistics
 Gainesville, Florida

UNIVERSITY OF GEORGIA
 Dept of Statistics
 Athens, Georgia

UNIVERSITY OF ILLINOIS
 Dept of Statistics
 Champaign, Illinois

UNIVERSITY OF ILLINOIS AT CHICAGO
 Dept of Math, Stat and Comp Sci
 Chicago, Illinois

UNIVERSITY OF IOWA
 Dept of Statistics and Actuarial Sci
 Iowa City, Iowa

UNIVERSITY OF MARYLAND
 Dept of Mathematics
 College Park, Maryland

UNIVERSITY OF MASSACHUSETTS
 Dept of Mathematics and Statistics
 Amherst, Massachusetts

UNIVERSITY OF MINNESOTA
 School of Statistics
 Minneapolis, Minnesota

UNIVERSITY OF MINNESOTA
 Library
 Minneapolis, Minnesota

UNIVERSITY OF MISSOURI
 Ellis Library
 Columbia, Missouri

UNIVERSITY OF MONTREAL
 Dept of Mathematics
 Montreal, Quebec, Canada

UNIVERSITY OF NEBRASKA
 Dept of Mathematics and Statistics
 Lincoln, Nebraska

UNIVERSITY OF NEW BRUNSWICK LIBRARY
 Fredericton, New Brunswick, Canada

UNIVERSITY OF NEW MEXICO
 Dept of Mathematics and Statistics
 Albuquerque, New Mexico

UNIVERSITY OF NORTH CAROLINA
 Dept of Statistics
 Chapel Hill, North Carolina

UNIVERSITY OF OREGON
 Dept of Mathematics
 Eugene, Oregon

UNIVERSITY OF OTTAWA
 Dept of Mathematics
 Ottawa, Ontario, Canada

UNIVERSITY OF PENNSYLVANIA
 Dept of Statistics
 Philadelphia, Pennsylvania

UNIVERSITY OF THE PHILIPPINES AT
 LOS BAÑOS
 Library
 Laguna, Philippines

UNIVERSITY OF PITTSBURGH
 Mathematics Library
 Pittsburgh, Pennsylvania

UNIVERSITY OF SOUTH CAROLINA
 Dept of Statistics
 Columbia, South Carolina

STOCKHOLM UNIVERSITY
 Inst of Actuarial Math and Math Stat
 Stockholm, Sweden

UNIVERSITY OF TEXAS AT AUSTIN
 Dept of Mathematics
 Austin, Texas

UNIVERSITY OF TEXAS AT DALLAS
 Program in Mathematical Sciences
 Richardson, Texas

UNIVERSITY OF TEXAS HSC HOUSTON
 School of Public Health Library
 Houston, Texas

UNIVERSITY OF VICTORIA
 Dept of Mathematics
 Victoria, British Columbia, Canada

UNIVERSITY OF VIRGINIA
 Dept of Mathematics
 Charlottesville, Virginia

UNIVERSITY OF WASHINGTON
 Dept of Statistics
 Seattle, Washington

UNIVERSITY OF WATERLOO
 Dept of Statistics and Actuarial Sci
 Waterloo, Ontario, Canada

US DEPT OF AGRICULTURE
 Forest Service
 New Orleans, Louisiana

US DEPT OF THE AIR FORCE
 Air Weather Service Technical Library
 Scott AFB, Illinois

VIRGINIA COMMONWEALTH UNIVERSITY
 Dept of Mathematical Sciences
 Richmond, Virginia

VIRGINIA POLYTECHNIC INSTITUTE
 AND STATE UNIVERSITY
 Dept of Statistics
 Blacksburg, Virginia

WAKE FOREST UNIVERSITY
 Z. Smith Reynolds Library
 Winston-Salem, North Carolina

WAYNE STATE UNIVERSITY
 Dept of Mathematics
 Detroit, Michigan

YORK UNIVERSITY
 Dept of Mathematics
 Downsview, Ontario, Canada

THE ANNALS OF PROBABILITY

INSTRUCTIONS FOR AUTHORS

Submission of Papers. Papers to be submitted for publication should be sent to the Editor of the *Annals of Probability*. (For current address, see the latest issue of the *Annals*.) **Three copies** should be submitted on paper that will take ink corrections. The manuscript will *not* normally be returned to the author; when expressly requested by the author, one copy of the manuscript will be returned. All manuscripts should be accompanied by a cover letter.

Preparation of Manuscript. Manuscripts should be typewritten, entirely double-spaced, including references, with wide margins at sides, top and bottom. All copies must be completely legible. When technical reports are submitted, all extraneous sheets and covers must be removed. Typists should check an issue of the *Annals* for style.

Electronic Submission of Accepted Papers. You are encouraged to submit papers written in some form of \TeX . All forms of \TeX (e.g. \LaTeX , \AMS-TeX , etc.) are acceptable. Please do not send a disk with your original submission. On acceptance of a paper written in \TeX , you will be asked to provide an electronic copy for the Production Editor, either on a 3½-inch disk or by e-mail.

Submission of Reference Papers. Two copies of unpublished or not easily available papers cited in the manuscript should be submitted with the manuscript.

Title. The title should be descriptive and as concise as is feasible, i.e., it should indicate the topic of the paper as clearly as possible, but every word in it should be pertinent.

Abbreviated Title. An abbreviated title to be used as a running head is also required. This should normally not exceed 35 characters.

Affiliation and Addresses. Indicate your present institutional affiliation as you would like it to appear. List the permanent mailing address of each author after the references.

Summary. Each manuscript is required to contain a summary, clearly separated from the rest of the paper, which will be printed immediately after the title. Its main purpose is to inform the reader quickly of the nature and results of the paper; it may also be used as an aid in retrieving information. The length of a summary will clearly depend on the length and difficulty of the paper, but in general it should not exceed 150 words. Formulas should be used as sparingly as possible within the summary. The summary should not make reference to results or formulas in the body of the paper—it should be self-contained.

Footnotes. Footnotes should not be used, except as described under Title Page Footnotes below. Such information should be included within the text.

Title Page Footnotes. Included as a footnote on page 1 should be the headings:

American Mathematical Society 1991 subject classifications. Primary—; secondary—.
Key words and phrases.

The classification numbers representing the primary and secondary subjects of the article may be found with instructions for its use in the *Mathematical*

Reviews Annual Subject Index-1991. The key words and phrases should describe the subject matter of the article; generally they should be taken from the body of the paper.

Acknowledgment of support. Grants and contracts should also be included in this footnote.

Identification of Symbols. Manuscripts for publication should be clearly prepared to insure that all symbols are properly identified. Distinguish between “oh” and “zero,” “ell” and “one,” “epsilon” and “element of,” “summation” and “capital sigma,” etc. Indicate also when special type is required (Greek, German, script, boldface, etc.); unless indicated otherwise, formula letters will be set in italics. Acronyms should be introduced sparingly. Any handwritten symbols should be clearly identified.

Figures and Tables. Figures, charts, and diagrams should be prepared in a form suitable for photographic reproduction and should be professionally drawn twice the size they are to be printed. (These need not be submitted until the paper has been accepted for publication.) The printer does not improve upon the quality of the figures submitted. Tables should be typed on separate pages with accompanying footnotes immediately below the table.

Formulas. Fractions *in the text* are preferably written with the solidus or negative exponent; thus, $(a + b)/(c + d)$ is preferred to $\frac{a+b}{c+d}$, and $(2\pi)^{-1}$ or $1/(2\pi)$ to $\frac{1}{2\pi}$. Also, $a^{b(c)}$ and $a_{b(c)}$ are preferred to a^{bc} and $a_{b,c}$, respectively. Complicated exponentials should be represented with the symbol exp. A fractional exponent is preferable to a radical sign.

References. References should be typed double-spaced and should follow the style:

Révész, P. (1982). On the increments of Wiener and related processes. *Ann. Probab.* **10** 613–622.

In textual material; the format “... Révész (1982)...” should be used. Multiple references can be distinguished as “... Révész (1982a)...”. Abbreviations for journals should be taken from a current index issue of *Mathematical Reviews*.

Copyright, Page Charges and Offprints. Page charges are \$45 per printed page. Payment of some or all of the estimated page charges associated with articles is strongly encouraged. The editorial review of articles and administration of page charges are completely separate activities. Manuscripts are reviewed and accepted prior to determining whether page charges will be paid.

Corresponding authors receive 25 gratis offprints. Offprints of discussion articles include the main article(s), discussion(s) and rejoinder(s) as a package. Corresponding authors of main articles receive 25 gratis offprints; corresponding discussants receive 10 gratis offprints. Additional offprints may be purchased by using the IMS Offprint Purchase Order Form accompanying the galley.

Copyright transfer, page charges and offprints are the responsibility of the IMS Business Manager.

Galley Proofs. The corresponding author will ordinarily receive galley proofs. Corrected galley proofs should be sent to: AOP Redactory, Technical Typesetting Inc., 1510 Caton Center Drive, Suite E, Baltimore, MD 21227.