

MATHEMATICAL PHYSICS

John R. Klauder, Editor
 Barbara Chippendale, Assistant to the Editor
 Eugene I. Blount and L. R. Walker, Associate Editors

Editorial Board

Term ending 31 December 1985

Ludwig Faddeev (Steklov Math. Inst., Leningrad)
 Elliott Lieb (Princeton)
 Charles Newman (U. of Arizona)
 Roger Newton (Indiana U.)
 Ludwig Streit (U. of Bielefeld, W. Germany)
 John A. Wheeler (U. of Texas, Austin)

Term ending 31 December 1986

David K. Campbell (Los Alamos Natl. Lab.)
 K. M. Case (Rockefeller U., NY)
 B. Kent Harrison (Brigham Young U., Utah)
 Jiff Patera (U. of Montreal)
 F. H. Stillinger (AT&T Bell Labs, NJ)
 E. C. G. Sudarshan (U. of Texas, Austin)

Term ending 31 December 1987

Michael Aizenman (Rutgers U., NJ)
 M. T. Grisaru (Brandeis U., MA)
 Allen I. Janis (U. Pittsburgh)
 John D. Morgan, III (U. Delaware, Newark)
 David H. Sharp (Los Alamos Natl. Lab.)
 Hugo D. Wahlquist (Jet Propulsion Lab, Caltech)

AIP EDITORIAL STAFF: Rosalind Nissim, *Editorial Supervisor*; Kathleen Bubbeo, *Chief Copy Editor*; Meryl Greenblatt, *Copy Editor*

The *Journal of Mathematical Physics* is published monthly by the American Institute of Physics (AIP). Its purpose is to form a medium of publication of highly mathematical physics articles and papers on branches of mathematics that are currently or potentially useful for the development of theoretical physics. Mathematical manuscripts should be written in a manner that is understandable to theoretical physicists. Although most papers appearing in this journal are original, occasionally reviews of mathematical topics of interest to physicists will be published.

Information for Contributors

Submit manuscripts (3 copies) to John R. Klauder, Editor, *Journal of Mathematical Physics*, AT&T Bell Laboratories, Murray Hill, NJ 07974. Submission is a representation that the manuscript has not been published previously nor currently submitted for publication elsewhere. The manuscript should be accompanied by a statement transferring copyright from the authors (or their employers—whoever holds the copyright) to AIP; a suitable form for copyright transfer is occasionally printed in the back of this journal and is also available from the Editor's office or AIP. This written transfer of copyright, which previously was assumed to be implicit in the act of submitting a manuscript, is necessary under the 1978 U.S. copyright law in order for AIP to continue disseminating physics research results as widely as possible. Further information may be obtained from AIP.

Index the article according to AIP's *Physics and Astronomy Classification Scheme-1985* (PACS)—see *Phys. Rev. Lett.* **53**, No. 22 (1984) or *Phys. Today* **37**, No. 12 (Dec. 1984). Choose up to four PACS numbers and type them in order of importance after the abstract.

Publication Charge: To support the cost of wide dissemination of research results through publication of journal pages and production of a data base of articles, the author's institution is requested to pay a *page charge* of \$40 per page (with a one-page minimum) and an *article charge* of \$20 per article. The page charge (if honored) entitles the author to 100 free reprints. For **Errata** the minimum page charge is \$10, with no article charge and no free reprints. Nonpayment of the publication charge may lead to delays in publication.

Manuscripts should be typewritten in black ink on durable white paper, and on one side only. They should be double-spaced (including abstracts and references) with wide margins, and an original submitted to the Editor. Authors should retain a copy of their manuscript and submit 2 copies with the original. The *Style Manual* (\$7.50 prepaid) of AIP will be most helpful in the preparation of manuscripts.

References should appear as consecutively numbered footnotes. Literature citations of technical journals should be in the form indicated in the *Style Manual* of AIP.

Tables must be typewritten on sheets separate from the running text. Each table must have a caption that will make

the data in the table intelligible without reference to the text. Avoid complicated column headings.

Equations should be neatly typed or written in ink, punctuated and aligned to bring out their structure, and numbered on the right. To indicate continuity of mathematical expressions use "X" rather than a centered dot, except for scalar products of vectors. Use "exp" for complicated exponents.

Notation must be legible, clear, compact, and consistent with standard usage. All unusual or handwritten symbols whose identity may not be obvious must be identified in the margin the first time they appear, and at all subsequent times when confusion might arise.

Figures should, whenever practicable, be planned for reproduction in one-column width (8.5 cm). Line drawings should be India ink on white paper or tracing cloth. The original drawing or a high-quality glossy print should be submitted. Lettering, preferably drawn with a mechanical set, should be of a size so that when reduced the smallest lower-case letters will not be less than about 1.5 mm. Avoid gross disparities in lettering size on a drawing.

AIP's **Physics Auxiliary Publication Service (PAPS)** is a low-cost depository for material which is part of and supplementary to a published paper, but is too long to be included in the journal; inquire of the Editor.

Proofs and all correspondence concerning papers in the process of publication should be addressed to: Editorial Supervisor, *Journal of Mathematical Physics*, American Institute of Physics, 335 East 45th Street, New York, NY 10017. In all correspondence reference should be made to title, author, journal, and scheduled date of issue. A limited number of **alterations in proof** are unavoidable, but the cost of making extensive alterations after the article has been set in type will be charged to the author.

Copyright 1985, American Institute of Physics. Individual teachers, students, researchers, and libraries acting for them are permitted to make copies of articles in this journal for their own use in research or teaching, including multiple copies for classroom or library reserve use, provided such copies are not sold. Copying for sale is subject to payment of copying fees. (See "Copying Fees" paragraph elsewhere in this journal.) Permission is granted to quote from this journal with the customary acknowledgment of the source. To reprint a figure, table, or other excerpt requires in addition the consent of one of the original authors and notification to AIP. Reproduction for advertising or promotional purposes, or republication in any form, is permitted only under license from AIP, which will normally require that the permission of one of the authors also be obtained. Direct inquiries to Office of Rights and Permissions, American Institute of Physics, 335 East 45th Street, New York, NY 10017.

361	Functions of infinite generalized cyclic matrices	Philippe Audit
365	On the integrability of certain symmetric representations of the Lie algebra of $SO_0(4,1)$	A. Bohm, P. Moylan
375	A Jacobson–Morozov lemma for $sp(2n, \mathbb{R})$	Hüseyin Kocak
377	Representations of Kac–Moody algebras by step algebras	Jouko Mickelsson
383	Spectral concentration for the Laplace operator in the exterior of a resonator	Claudio Fernández
385	Consistent superspace integration	Alice Rogers
393	Application of linked Bäcklund transformations to nonlinear boundary value problems	C. Rogers
396	Some properties of hyperspherical harmonics	Zhen-Yi Wen, John Avery
404	On the hyperbolic complex linear symmetry groups and their local gauge transformation actions	Zai-Zhe Zhong
407	Infinitesimal null isotropy and Robertson–Walker metrics	Lisa Koch-Sen
411	High-accuracy approximation techniques for analytic functions	Charles Schwartz
416	A new way for solving Laplace's problem (the predictor jump method)	J. M. Vega-Fernández, J. F. Duque-Carrillo, J. J. Peña-Bernal
420	Construction of the second constant of motion for two-dimensional classical systems	R. S. Kaushal, S. C. Mishra, K. C. Tripathy
428	The anti-self-dual Coulomb field in Minkowski space-time	John R. Porter
431	A twistor encoding of Lienard–Wiechert fields in Minkowski space-time	John R. Porter
434	Nontrivial zeros of the Wigner (3- <i>j</i>) and Racah (6- <i>j</i>) coefficients. I. Linear solutions	Simcha Brudno
436	Three-dimensional inverse scattering: High-frequency analysis of Newton's Marchenko equation	Margaret Cheney, James H. Rose
440	Scattering theory for extended elementary particles in nonrelativistic stochastic quantum mechanics	R. Gagnon
453	Schrödinger semigroups for vector fields	T. A. Osborn, R. A. Corns, Y. Fujiwara

(Continued)

Subscription Prices (1985)	Optional air freight			
	U.S.A. & Poss.	Foreign (incl. Can. & Mex.)	Europe, Mideast, N. Africa	Asia and Oceania
Members (affiliated & member societies)	\$ 50.00	\$ 66.00	\$ 75.00	\$ 95.00
Regular rate	\$440.00	\$456.00	\$465.00	\$485.00

Back-Number Prices. Single copies: \$40.00.

The *Journal of Mathematical Physics* (ISSN: 0022-2488) is published monthly by the American Institute of Physics. Second-class postage rates paid at Woodbury, NY and at additional mailing offices.

Subscriptions, renewals, address changes, and single-copy orders should be addressed to AIP Subscription Fulfillment Division, 335 East 45th St., New York, NY 10017. Allow at least six weeks advance notice. For address changes please send both old and new addresses and, if possible, include a label from the mailing wrapper of a recent issue. For your convenience a **change of address form is included in every issue of *Physics Today*; please use it.** Requests from subscribers for missing journal issues will be honored without charge only if received within six months of the issue's actual date of publication; otherwise, the issue may be purchased at the single-copy price. (AIP Headquarters are located at 335 East 45th St., New York, NY 10017; Subscription Fulfillment offices are located at 500 Sunnyside Blvd., Woodbury, NY 11797.)

Reprints of individual articles in this journal may be ordered singly at \$10.00 per article copy (postage included) for articles up to 20 pages. Beyond 20 pages there is a surcharge of \$0.20 per page. Air mail delivery available. Orders are filled in 24 hours. Send orders to the American Institute of Physics, *Current Physics Reprints*, 335 East 45th St., New York, NY 10017.

Copying Fees: The code that appears on the first page of articles in this journal gives the fee for each copy of the article made beyond the free copying permitted by AIP. (See statement under "Copyright" elsewhere in this journal.) If no code appears, no fee applies. The fee for pre-1978 articles is \$0.25 per copy. With the exception of copying for advertising and promotional purposes, the express permission of AIP is not required provided the fee is paid through the *Copyright Clearance Center, Inc. (CCC)*, 21 Congress Street, Salem, MA 01970. Contact the CCC for information on how to report copying and remit payment.

Microfilm subscriptions of complete volumes of *Journal of Mathematical Physics* are available on 16 mm and 35 mm. Special discounts for the complete backfile of journals published by AIP are also available. *Journal of Mathematical Physics* also appears on a monthly basis in *Current Physics Microform (CPM)* Section I along with 26 other journals published by the American Institute of Physics and its member societies. A *Microfilm Catalog* is available on request. *Journal of Mathematical Physics* is indexed quarterly in *Current Physics Index*, a subject and author index (with abstracts) to all journals published by AIP and its member societies.