

JOURNAL OF PLASMA PHYSICS

VOLUME 50
1993



CAMBRIDGE
UNIVERSITY PRESS

JOURNAL OF PLASMA PHYSICS exists for the publication of experimental and theoretical research papers on plasma physics and its applications.

EDITOR

DR J. P. DOUGHERTY

*Department of Applied Mathematics and Theoretical Physics, University of Cambridge,
Silver Street, Cambridge CB3 9EW, England*

ASSOCIATE EDITORS

PROF. E. INFELD

Soltan Institute, Hoza 69, Warsaw, PL 00681, Poland

PROF. P. K. KAW

Institute for Plasma Research, Bhat, Gandhinagar 382 424, India

PROF. D. B. MELROSE

*Research Centre for Theoretical Astrophysics, School of Physics,
The University of Sydney, Sydney NSW 2006, Australia*

PROF. G. J. PERT

Department of Physics, University of York, Heslington, York YO1 5DD, England

DR PADMA K. SHUKLA

Institut für Theoretische Physik IV, Ruhr-Universität Bochum, D-44780 Bochum 1, Germany

DR GARY ZANK

Bartol Research Institute, University of Delaware, Newark DE19716-4793, USA

© Cambridge University Press 1993

Copying

This journal is registered with the Copyright Clearance Center, 27 Congress St., Salem, Mass. 01970. Organizations in the USA who are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per copy fee of \$05.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0022-3778/93 \$5.00 + .00.

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, Pennsylvania 19104, USA, is authorized to supply single copies of separate articles for private use only.

Organizations authorized by the Copyright Licensing Agency may also copy material subject to the usual conditions.

For all other use, permission should be sought from Cambridge or the American Branch of Cambridge University Press.

JOURNAL OF PLASMA PHYSICS (ISSN 0022-3778) is published once every two months in February, April, June, August, October and December, by Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU and Journals Department, 40 West 20th Street, New York, NY 10011-4211.

Three parts form a volume. The subscription price (which includes postage) of Volumes 49 and 50 (1993) is £137.00 net, per volume (US \$265.00 in the USA, Canada and Mexico) for institutions; £68.50 (US \$180.00) per volume for individuals. Single parts cost £47.00 each (US \$90.00 in the USA, Canada and Mexico) plus postage. All orders must be accompanied by payment.

Copies of the journal for subscribers in the United States of America and Canada are sent by air to New York to arrive with minimum delay.

Japanese prices for institutions (including ASP delivery) are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo.

Second class postage paid at New York, NY, and at additional mailing offices. POSTMASTER: send address changes in USA, Canada and Mexico to *Journal of Plasma Physics*, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573-9864.

CONTENTS TO VOLUME 50

PART 1 AUGUST 1993

- The filamentary structure in the accelerating plasma sheath of a plasma focus: a simplified tri-dimensional analysis. A. DI VITA 1
- Three-dimensional equilibria in DRAKONs with an anisotropic temperature. ZHANG-HUI, M. TENG-CAI and W. JI-FENG 21
- Nonlinear propagation of ion-acoustic waves and low-frequency electrostatic modes in a dusty plasma. U. A. MOFIZ, M. ISLAM and Z. AHMED 37
- Short-wave low-frequency equilibrium spectra in a current-carrying plasma. M. O. VAKOULENKO 45
- A time-dependent model for high-pressure discharges in narrow ablative capillaries. D. ZOLER, S. CUPERMAN, J. ASHKENAZY, M. CANER and Z. KAPLAN 51
- Low-frequency surface acoustic waves in a collisionless plasmas. S. V. VLADIMIROV and M. Y. YU 71
- Wake field in electron-positron plasma. K. AVANISH and V. I. BEREZHIANI 79
- Cosmic ray particle transport in weakly turbulent plasmas. Part 2. Mean free path of cosmic ray protons. R. SCHLICKEISER and U. ACHATZ 85
- Reflection and absorption of ordinary waves in an inhomogeneous plasma. R. CROCI 109
- Transport coefficients for an equal-mass plasma in a uniform magnetic field. S. Y. ABDUL-RASSAK and E. W. LAING 125
- Expansion of a quantum electron gas. S. MOLA, G. MANFREDI and M. R. FEIX 145
- Variational theory of the cyclotron emission source distribution from a mode conversion layer. V. F. SHVETS and D. G. SWANSON 163

PART 2 OCTOBER 1993

- An analytical method for the investigation of instability of a collisionless plasma in strong magnetic fields. V. U. ZAKHAROV 185
- Magnetic-moment field generation in the reflection region in a cold magnetized plasma. C. DAS, B. BERA, B. CHAKRABORTY and M. KHAN 191

Thermodynamic stability of a tokamak plasma. M. BRUSATI and A. DI VITA	201
Observation of modulational instability in a multi-component plasma with negative ions. H. BAILUNG and Y. NAKAMURA	231
The Bohm criterion in the presence of radio-frequency fields. J. E. ALLEN and M. A. SKORIK	243
Outline of a theory of lower-hybrid wave absorption. E. CANOBBIO and R. CROCI	251
Scintillations in a magnetized plasma. Part 1. The mutual coherence function. D. B. MELROSE	267
Scintillations in a magnetized plasma. Part 2. The fourth-order moment. D. B. MELROSE	283
Perturbation region near a biased body in a flowing collision-dominated plasma with low ionization density. Current-voltage characteristics of a Langmuir probe. M. S. BENILOV	293
The neighbouring vibrating 'multiple water-bag' plasma potential and related aspects. L. CHEE-SENG	309
Effect of collisions on the magnetization current in a plasma. G. BRODIN and L. STENFLO	325
Excitation of ion-cyclotron waves by a spiralling ion beam in a plasma cylinder. S. C. SHARMA and V. K. TRIPATHI	331
Millimetre-wave second-harmonic generation in an underdense magnetoplasma in the presence of a magnetic wiggler. J. PARASHAR, H. D. PANDEY, K. RAMACHANDRAN and R. K. SINGH	339
Corrigendum. S. H. KIM	345

PART 3 DECEMBER 1993

Solitons in a magnetized ion-beam plasma system. B. C. KALITA, M. K. KALITA and R. P. BHATTA	349
Ion modes in strongly coupled two-component plasmas. M. A. BERKOVSKY	359
Wave properties of a cylindrical antenna immersed in a magneto-active plasma. N. A. AZARENKOV, I. B. DENISENKO and K. N. OSTRIKOV	369
Relaxed state of a toroidal fusion plasma with stationary flows. R. ŽELAZNY and A. GAŁKOWSKI	385

Anomalous absorption of a radio wave in the ionosphere. V. K. TRIPATHI, B. K. SAWHNEY and S. V. SINGH	403
Determination of the growth rate for the linearized Zakharov–Kuznetsov equation. M. A. ALLEN and G. ROWLANDS	413
The drift-wave dispersion equation revisited. R. BALESCU, E. VANDEN EIJNDEN and B. WEYSSOW	425
Oblique nonlinear Alfvén waves in strongly magnetized beam plasmas. Part 1. Nonlinear vector evolution equation. B. DECONINCK, P. MEURIS and F. VERHEEST	445
Oblique nonlinear Alfvén waves in strongly magnetized beam plasmas. Part 2. Soliton solutions and integrability. B. DECONINCK, P. MEURIS and F. VERHEEST	457
Nonlinear growth of strongly unstable tearing modes. F. L. WAELBROECK	477
Contribution of higher-order nonlinearity to nonlinear ion-acoustic waves in a weakly relativistic warm plasma. Part 1. Isothermal case. S. K. EL-LABANY	495
Entropy of Vlasov equilibria and Hamilton’s principle. E. MINARDI	505
Nonlinear electrostatic waves in equal-mass plasmas. G. A. STEWART	521
AUTHOR INDEX TO VOLUME 50	537

INSTRUCTIONS TO AUTHORS

Authors wishing to have papers published in the *JOURNAL* should communicate them to any one of the editorial board, choosing one in their own country where possible.

Authors are urged to ensure that their papers are written clearly and attractively, in order that their work will be readily accessible to readers.

Manuscripts should be typed in double spacing on one side of the paper only, with references listed at the end in alphabetical order of authors. Drawings should be done in Indian ink on plain white or transparent paper, and should not be larger than 15 in. by 24 in. Lettering should be shown clearly in pencil for reproduction by the printer, and as far as possible information relating to a figure should be placed in the caption rather than on the figure. A typed list of captions should be provided at the end of the manuscript. Proofs of papers from overseas will usually be despatched to authors by airmail. There is no charge for publication. Authors are entitled to receive 50 offprints of a paper in the *JOURNAL* free of charge, and additional offprints can be purchased if ordered in advance.

© Cambridge University Press 1993

CAMBRIDGE UNIVERSITY PRESS

THE PITT BUILDING, TRUMPINGTON STREET, CAMBRIDGE CB2 1RP

40 WEST 20TH STREET, NEW YORK, NY 10011-4211, USA

10 STAMFORD ROAD, OAKLEIGH, MELBOURNE 3166, AUSTRALIA

Printed in Great Britain by the University Press, Cambridge

JOURNAL OF PLASMA PHYSICS

Volume 50 Part 3 December 1993

CONTENTS

Solitons in a magnetized ion-beam plasma system B. C. KALITA, M. K. KALITA AND R. P. BHATTA	349
Ion modes in strongly coupled two-component plasmas M. A. BERKOVSKY	359
Wave properties of a cylindrical antenna immersed in a magneto- active plasma N. A. AZARENKOV, I. B. DENISENKO AND K. N. OSTRIKOV	369
Relaxed state of a toroidal fusion plasma with stationary flows R. ŽELAZNY AND A. GAŁKOWSKI	385
Anomalous absorption of a radio wave in the ionosphere V. K. TRIPATHI, B. K. SAWHNEY AND S. V. SINGH	403
Determination of the growth rate for the linearized Zakharov–Kuznetsov equation M. A. ALLEN AND G. ROWLANDS	413
The drift-wave dispersion equation revisited B. BALESCU, E. VANDEN EIJNDEN AND B. WEYSSOW	425
Oblique nonlinear Alfvén waves in strongly magnetized beam plasmas. Part 1. Nonlinear vector evolution equation BERNARD DECONINCK, PETER MEURIS AND FRANK VERHEEST	445
Oblique nonlinear Alfvén waves in strongly magnetized beam plasmas. Part 2. Soliton solutions and integrability BERNARD DECONINCK, PETER MEURIS AND FRANK VERHEEST	457
Nonlinear growth of strongly unstable tearing modes F. L. WAELBROECK	477
Contribution of higher-order nonlinearity to nonlinear ion-acoustic waves in a weakly relativistic warm plasma. Part 1. Isothermal case S. K. EL-LABANY	495
Entropy of Vlasov equilibria and Hamilton's principle E. MINARDI	505
Nonlinear electrostatic waves in equal-mass plasmas G. A. STEWART	521
AUTHOR INDEX TO VOLUME 50	537

CAMBRIDGE
UNIVERSITY PRESS

0022-3778(199312)50:3;1-0