

PROCEEDINGS OF  
THE ROYAL SOCIETY  
OF LONDON

SERIES A

VOLUME 410

MATHEMATICAL AND PHYSICAL SCIENCES

1987

PUBLISHED BY THE ROYAL SOCIETY  
6 CARLTON HOUSE TERRACE LONDON SW1Y 5AG

The two numbers in this volume can be obtained separately from the Royal Society, 6 Carlton House Terrace, London SW1Y 5AG.

### **Copyright**

© 1987 The Royal Society and the authors of individual papers.

It is the policy of the Royal Society not to charge any royalty for the production of a single copy of any one article made for private study or research. Requests for the copying or reprinting of any article for any other purpose should be sent to the Royal Society.

*Printed in Great Britain by the University Press, Cambridge*

# CONTENTS

## SERIES A VOLUME 410

NUMBER 1838 9 MARCH 1987

Short-scale waves on wind-driven water ('cat's paws'). By P. J. Blennerhassett and F. T. Smith, F.R.S.	page 1
A stochastic model of sea-surface roughness. I. Wave crests. By M. S. Longuet-Higgins, F.R.S.	19
Asymptotic expansions for the coefficient functions that arise in turning-point problems. By W. G. C. Boyd	35
On the role of inertial effects and dipole-dipole coupling in the theory of the Debye and far-infrared absorption of polar fluids. By W. T. Coffey, P. M. Corcoran and M. W. Evans	61
Electronic processes in small semiconductor particles. By J. J. Ramsden	89
Valid randomization. By R. A. Bailey and C. A. Rowley	105
Static configuration of liquid films on horizontal tubes with low radial fins: implications for condensation heat transfer. By H. Masuda and J. W. Rose. [Plates 1 and 2]	125
Quantum-electrodynamic level shifts between parallel mirrors: analysis. By G. Barton	141
Quantum-electrodynamic level shifts between parallel mirrors: applications, mainly to Rydberg states. By G. Barton	175
Gravitational radiation near spatial and null infinity. By B. G. Schmidt	201
The role of three-dimensional shapes in the break-up of charged drops. By R. Natarajan and R. A. Brown	209
Frequency cross-spectrum of intensity fluctuations produced by a deep-phase screen. By Sarah J. Miller	229

NUMBER 1839 8 APRIL 1987

The award of medals by the President, Sir George Porter, at the Anniversary Meeting, 1 December 1986	249
ESSO ENERGY AWARD LECTURE, 1986: Advances in numerical weather prediction for aviation forecasting. By P. W. White, M. J. P. Cullen, A. J. Gadd, C. R. Flood, T. N. Palmer, K. Pollard and G. Shutts	255
Some models for rainfall based on stochastic point processes. By I. Rodriguez-Iturbe, D. R. Cox, F.R.S., and Valerie Isham	269
R-matrix theory of electron scattering at intermediate energies. By P. G. Burke, F.R.S., C. J. Noble and Penny Scott	289
On colliding waves that develop time-like singularities: a new class of solutions of the Einstein-Maxwell equations. By Subrahmanyan Chandrasekhar, F.R.S., and Basilis C. Xanthopoulos	311
Change in chiroptical properties caused by intermolecular coupling. By D. P. Craig, F.R.S., and T. Thirunamachandran	337

Evidence of surface-reaction segregation in cyclohexene hydrogenation and dehydrogenation over supported platinum. By P. A. Sermon, G. Georgiades, Mariana S. W. Vong, Maria A. Martin-Luengo and P. N. Reyes. [Plate 1]	353
Weighted Sobolev spaces and exterior problems for the Helmholtz equation. By P. Neittaanmäki and G. F. Roach	373
A model for the onset of fast-ion conduction in fluorites. By A. R. Allnatt, A. V. Chadwick and P. W. M. Jacobs	385
Sum rules for the pair-correlation functions of inhomogeneous fluids: results for the hard-sphere-hard-wall system. By D. Henderson and M. Plischke	409
A new statistical distribution function for fracture toughness. By D. J. Neville	421
Applications of classical plasticity theory to non-radial loading paths. By D. W. A. Rees	443
Charge injection and loss in AC corona. By H. Elayyan, G. Hartmann, A. Robledo-Martinez and R. T. Waters	477
Instructions to Authors	501
Indexes	505