

INTERNATIONAL JOURNAL OF
SOLIDS and
STRUCTURES

Volume Contents and Author Index
Volume 24, 1988



PERGAMON PRESS

OXFORD · NEW YORK

BEIJING · FRANKFURT · SÃO PAULO · SYDNEY · TOKYO · TORONTO

INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES

Editor-in-Chief: CHARLES STEELE

Associate Editor: MARIE-LOUISE STEELE

*Division of Applied Mechanics
Stanford University, Stanford, California
94305*

Consulting Editor and Editor-in-Chief, 1965-1985: GEORGE HERRMANN

Board of Editors

J. D. ACHENBACH	<i>Northwestern University</i>
B. A. BOLEY	<i>Columbia University</i>
V. V. BOLOTIN	<i>USSR Academy of Sciences</i>
L. FINZI	<i>Milan Polytechnic Institute</i>
Y. C. FUNG	<i>University of California, San Diego</i>
H. J. GREENBERG	<i>University of Denver</i>
H. LIEBOWITZ	<i>The George Washington University</i>
C. MASSONNET	<i>University of Liege</i>
E. W. PARKES	<i>University of Leeds</i>
W. ZERNA	<i>Ruhr-Universität, Bochum</i>
O. C. ZIENKIEWICZ	<i>University College of Swansea</i>
H. ZORSKI	<i>Polish Academy of Sciences</i>

Editorial Advisory Board

J. H. ARGYRIS	<i>Stuttgart</i>	M. MIKKOLA	<i>Helsinki</i>
L. BEVILACQUA	<i>Rio de Janeiro</i>	F. NIORDSON	<i>Lyngby</i>
J. L. ERICKSEN	<i>Minneapolis</i>	F. DEL POZO	<i>Madrid</i>
J. FERRY BORGES	<i>Lisbon</i>	E. REISSNER	<i>California</i>
N. J. HOFF	<i>Stanford</i>	J. SINGER	<i>Huifa</i>
W. T. KOITER	<i>Delft</i>	I. N. SNEDDON	<i>Glasgow</i>
H. LIPPMANN	<i>München</i>	F. ZIEGLER	<i>Wien</i>

Publishing, Subscription and Advertising Offices: Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, U.K.; Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, U.S.A.

Published monthly. Annual institutional subscription rate (1989) DM 1205.00. Two-year institutional rate (1989/90) DM 2289.50. Personal subscription rate for those whose library subscribes at the regular rate (1989) DM 231.00. Prices are subject to change without notice. Subscription enquiries from customers in North America should be sent to: Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, U.S.A., and for the remainder of the world to: Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, U.K.

Back Issues

Back issues of all previously published volumes are available direct from Pergamon Press. Back issues of Pergamon journals in microform can be obtained from: UMI, 300 North Zeeb Road, Ann Arbor, MI 48106, U.S.A.

Copyright © 1988 Pergamon Press plc

It is a condition of publication that manuscripts submitted to the journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature, and translations. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

PHOTOCOPYING INFORMATION FOR USERS IN THE U.S.A.

The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying, beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of \$3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970.

PERMISSION FOR OTHER USE

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

The Item-fee Code for this publication is: 0020-7683/88 \$3.00 + .00

Volume Contents

NUMBER 1

- Madhukar Vable and David L. Sikarskie** 1 Stress analysis in plane orthotropic material by the boundary element method
- W. J. Bottega** 13 On thin film delamination growth in a contracting cylinder
- Tribikram Kundu** 27 Dynamic interaction between two interface cracks in a three-layered plate
- D. Gross and Ch. Zhang** 41 Diffraction of SH waves by a system of cracks: solution by an integral equation method
- Henrik Myhre Jensen** 51 Collapse of hydrostatically loaded cylindrical shells
- T. C. T. Ting and Chyanbin Hwu** 65 Sextic formalism in anisotropic elasticity for almost non-semisimple matrix N
- M. J. Forrestal, V. K. Luk and H. A. Watts** 77 Penetration of reinforced concrete with ogive-nose penetrators
- J. C. Boot and D. B. Moore** 89 Stiffened plates subject to transverse loading
- D. Nowell and D. A. Hills** 105 Contact problems incorporating elastic layers

NUMBER 2

- Jacob Aboudi** 117 Wave propagation in damaged composite materials
- R. K. N. D. Rajapakse** 139 A torsion load transfer problem for a class of non-homogeneous elastic solids
- E. N. Kuznetsov** 153 Underconstrained structural systems
- D. A. Sotiropoulos and J. D. Achenbach** 165 Crack characterization by an inverse scattering method
- Huajian Gao** 177 Nearly circular shear mode cracks
- V. P. Iu and C. Y. Chia** 195 Non-linear vibration and postbuckling of unsymmetric cross-ply circular cylindrical shells
- Néstor Zouain Pereira, Lavinia Alves Borges and Mildred Ballin Hecke** 211 A force method for elastic-plastic analysis of frames by quadratic optimization

NUMBER 3

- M. Ortiz** 231 Microcrack coalescence and macroscopic crack growth initiation in brittle solids
- J. H. Liu and Norman Jones** 251 Dynamic response of a rigid plastic clamped beam struck by a mass at any point on the span
- Júlio M. Montalvão e Silva and António P. V. Ugueira** 271 Out-of-plane dynamic response of curved beams—an analytical model
- C. R. Champion** 285 The stress intensity factor history for an advancing crack under three-dimensional loading
- V. Banthia and C. Y. Hui** 311 The transient stress field near the tip of a stationary crack in a material undergoing creep-constraint grain boundary cavitation
- N. Paydar** 313 Stress analysis of annular sandwich plates of linearly varying thickness
- David Johnson** 321 A cellular analogy for the elastic-plastic Saint-Venant torsion problem

NUMBER 4

- G. I. N. Rozvany, K. M. Yep, T. G. Ong and B. L. Karahaloo** 331 Optimal design of elastic beams under multiple design constraints
- G. Wayne Brodland** 351 Highly non-linear deformation of uniformly-loaded circular plates
- A. Bhimaraddi** 363 Generalized analysis of shear deformable rings and curved beams
- N. Katsube** 375 The anisotropic thermomechanical constitutive theory for a fluid-filled porous material with solid/fluid outer boundary
- J. L. Nowinski** 381 On the reflection of elastic waves incident on the boundary of a diatomic half-space
- M. Klisiński and Z. Mróz** 391 Description of inelastic deformation and degradation of concrete
- K-S. Kim and N. Aravas** 417 Elastoplastic analysis of the peel test

Announcements

- 437 **COMP '88: Phase Interaction in Composite Materials**, University of Patras, Patras 260 01, Greece, 22–27 August 1988
- 437 **12th Canadian Congress of Applied Mechanics—CANCAM '89**, Carleton University, Ottawa, Canada, 28 May–2 June 1989

NUMBER 5

- S. N. Chatterjee and V. Ramnath** 439 Modeling laminated composite structures as assemblage of sublaminates
- Anders Klarbring** 459 On discrete and discretized non-linear elastic structures in unilateral contact (stability, uniqueness and variational principles)
- M. Ashraf Ali and Srinivasan Sridharan** 481 A versatile model for interactive buckling of columns and beam-columns
- L. C. Zhang and T. X. Yu** 497 The plastic wrinkling of an annular plate under uniform tension on its inner edge
- E. Corona and S. Kyriakides** 505 On the collapse of inelastic tubes under combined bending and pressure
- Zenon Rychter** 537 An improved error estimate for Reissner's plate theory

NUMBER 6

- Yang Gao** 545 On the complementary bounding theorems for limit analysis
- G. Bezzine** 557 A new boundary element method for bending of plates on elastic foundations
- J. Tirosh and A. Miller** 567 Damage evolution and rupture in creeping of porous materials
- David Lasry and Ted Belytschko** 581 Localization limiters in transient problems
- A. Carini and O. De Donato** 599 Quadratic extremum principles for finite strain rigid-viscoplastic dynamics of continua
- C. A. Nelson and L. E. Goodman** 619 A hypercircle method of frame analysis—I. Theory
- C. A. Nelson and L. E. Goodman** 637 A hypercircle method of frame analysis—II. Practice
- Announcements*
- 657 Advanced Courses Organized in 1988 by CISM, International Centre for Mechanical Sciences
- 657 Third International Conference on "Structural Failure, Product Liability and Technical Insurance", Technical University Vienna, Vienna, Austria, 10-12 July 1989

NUMBER 7

- Zdeněk P. Bažant and Aleksander Zubelewicz** 659 Strain-softening bar and beam: exact non-local solution
- David Durban** 675 A finite strain axially-symmetric solution for elastic tubes
- K. T. Sundara Raja Iyengar, M. V. V. Murthy and M. N. Bapu Rao** 683 Three-dimensional elastic analysis of cracked thick plates under bending fields
- S. Pietruszczak, J. Jiang and F. A. Mirza** 705 An elastoplastic constitutive model for concrete
- M. A. Srinivasan** 723 Limit strength of locally loaded spherical domes: radial load at a circular cut-out
- Lynn Seaman** 735 Rotation transformations for two-dimensional calculations
- J. C. Amazigo and B. Budiansky** 751 Steady-state crack growth in supercritically transforming materials
- M. K. Kassir and G. C. Sih** 757 Letter to the Editor
- V. I. Fabrikant** 758 Author's closure

NUMBER 8

- R. Parnes** 761 A BPM solution for elliptic plates subjected to eccentric loads
- P. C. Dumir** 777 Large deflection axisymmetric analysis of orthotropic annular plates on elastic foundations
- Anna Dollar and Paul S. Steif** 789 Load transfer in composites with a Coulomb friction interface
- Kuang-Chong Wu** 805 Stress intensity factors due to non-elastic strains and body forces for steady dynamic crack extension in an anisotropic elastic material
- Leonard E. Schwer, Bayard S. Holmes and Steven W. Kirkpatrick** 817 Response and failure of metal tanks from impulsive spot loading: experiments and calculations
- J. Koplik and A. Needleman** 835 Void growth and coalescence in porous plastic solids
- Announcements*
- 855 Symposium on Advances and Trends in Computational Structural Mechanics and Fluid Dynamics, Sheraton National Hotel, Washington, DC, 17–19 October 1988

- 855 **BETECH 89, Boundary Element Technology, Windsor, Canada, 6–8 June 1989**
- 856 **NUMETA '90, University College of Swansea, U.K., 8–11 January 1990**
- 857 **Erratum**

NUMBER 9

- K. E. Barrett and S. Ellis** 859 An exact theory of elastic plates
- A. K. Bhattacharya and W. D. Nix** 881 Finite element simulation of indentation experiments
- Eric M. Lui and Wai-Fah Chen** 893 Behavior of braced and unbraced semi-rigid frames
- Mumtaz K. Kassir and Jimin Xu** 915 Interaction functions of a rigid strip bonded to saturated elastic half-space
- K. T. Kim** 937 Elastic–plastic response of porous metals under triaxial loading
- Frithiof I. Niordson** 947 The spectrum of free vibrations of a thin elastic spherical shell
- R. K. N. D. Rajapakse** 963 A note on the elastodynamic load transfer problem
- Larry A. Taber** 973 On a theory for large elastic deformation of shells of revolution including torsion and thick-shell effects

NUMBER 10

- K. Hashiguchi** 987 A mathematical modification of two surface model formulation in plasticity
- Hideo Takabatake** 1003 Lateral buckling of *I* beams with web stiffeners and batten plates
- Rohan Abeyaratne and James K. Knowles** 1021 On the dissipative response due to discontinuous strains in bars of unstable elastic material
- Wei Hua Tai** 1045 A damage mechanics model for anisotropic material and its application to sheet metal forming
- I.-Horng Yang and Jinn-An Shieh** 1059 Generic thermal buckling of initially stressed anti-symmetric cross-ply thick laminates
- Zheng-Guo Zhang and Yiu-Wing Mai** 1071 Letter to the Editor

V. I. Fabrikant

1074 Author's Closure

Announcement

1077 European Mechanics Colloquia 1989

NUMBER 11G. K. Haritos, J. W. Hager,
A. K. Amos, M. J. Salkind
and A. S. D. Wang

1081 Mesomechanics: the microstructure-mechanics connection

A. N. Kounadis

1097 Efficiency and accuracy of linearized postbuckling analyses of frames based on elastica

Esteban P. Busso and
Frank A. McClintock

1113 Stress-strain histories in coatings on single crystal specimens of a turbine blade alloy

Ting-Yu Rong

1131 Generalized mixed variational principles and new FEM models in solid mechanics

Sören Östlund and
Peter Gudmundson

1141 Asymptotic crack tip fields for dynamic fracture of linear strain-hardening solids

Randy J. Gu and
Francis A. Cozzarelli

1159 Strain-controlled creep rupture analysis of a beam on Winkler foundation

Announcement

1175 UPCAEDM '89, Seventh Annual Conference on University Programs in Computer Aided Engineering Design and Manufacturing, University of Wyoming, 23-26 July 1989

1177 Erratum

NUMBER 12D. E. Panayotounakos
and P. S. Theocaris

1179 Large deflections of buckled bars under distributed axial load

Yasuhide Shindo, Wei Li,
Yoshihisa Kanno and
Akira Atsumi

1193 Torsional impact response of an axisymmetric internal or edge crack in an elastic solid with a cylindrical cavity

R. K. N. D. Rajapakse
and A. H. Shah

1205 Hybrid modelling of semi-infinite media

M. R. M. Crespo da Silva

1225 Non-linear flexural-flexural-torsional-extensional dynamics of beams—I. Formulation

M. R. M. Crespo da Silva

1235 Non-linear flexural-flexural-torsional-extensional dynamics of beams—II. Response analysis

- S. T. Jenq, W. Goldsmith
and J. M. Kelly** 1243 Effect of target bending in normal impact of a flat-ended
cylindrical projectile near the ballistic limit
- B. N. Pandya and T. Kant** 1267 Higher-order shear deformable theories for flexure of
sandwich plates—finite element evaluations
- A. K. Bhattacharya and W. D. Nix** 1287 Analysis of elastic and plastic deformation associated
with indentation testing of thin films on substrates
- i Volume Contents and Author Index for Volume 24,
1988

Author Index

- Abeyaratne, R. 1021
 Aboudi, J. 117
 Achenbach, J. D. 165
 Ali, M. A. 481
 Amazigo, J. C. 751
 Amos, A. K. 1081
 Aravas, N. 417
 Atsumi, A. 1193

 Banthia, V. 301
 Bapu Rao, M. N. 683
 Barrett, K. E. 859
 Bažant, Z. P. 659
 Belytschko, T. 581
 Bezine, G. 557
 Bhattacharya, A. K. 881, 1287
 Bhimaraddi, A. 363
 Boot, J. C. 89
 Borges, L. A. 211
 Bottega, W. J. 13
 Brodland, G. W. 351
 Budiansky, B. 751
 Busso, E. P. 1113

 Carini, A. 599
 Champion, C. R. 285
 Chatterjee, S. N. 439
 Chen, W.-F. 893
 Chia, C. Y. 195
 Corona, E. 505
 Cozzarelli, F. A. 1159
 Crespo da Silva, M. R. M. 1225, 1235

 De Donato, O. 599
 Dollar, A. 789
 Dumir, P. C. 777
 Durban, D. 675
 Dvorak, G. J. 857

 Ellis, S. 859

 Fabrikant, V. I. 758, 1074
 Forrestal, M. J. 77

 Gao, H. 177
 Gao, Y. 545
 Goldsmith, W. 1243
 Goodman, L. E. 619, 637
 Gross, D. 41
 Gu, R. J. 1159
 Gudmundson, P. 1141

 Hager, J. W. 1081
 Haritos, G. K. 1081
 Hashiguchi, K. 987
 Hecke, M. B. 211

 Hills, D. A. 105
 Holmes, B. S. 817
 Hui, C. Y. 301
 Hwu, C. 65

 Iu, V. P. 195

 Jenq, S. T. 1243
 Jensen, H. M. 51
 Jiang, J. 705
 Johnson, D. 321
 Jones, N. 251

 Kanno, Y. 1193
 Kant, T. 1267
 Karihaloo, B. L. 331
 Kassir, M. K. 757, 915
 Katsube, N. 375
 Kelly, J. M. 1243
 Kim, K.-S. 417
 Kim, K. T. 937
 Kirkpatrick, S. W. 817
 Klarbring, A. 459
 Klisiński, M. 391
 Knowles, J. K. 1021
 Koplik, J. 835
 Kounadis, A. N. 1097
 Kundu, T. 27
 Kuznetsov, E. N. 153
 Kyriakides, S. 505

 Lasry, D. 581
 Laws, N. 857
 Lazaridis, P. P. 1177
 Li, W. 1193
 Liu, J. H. 251
 Lui, E. M. 893
 Luk, V. K. 77

 Mai, Y.-W. 1071
 McClintock, F. A. 1113
 Miller, A. 567
 Mirza, F. A. 705
 Montalvão e Silva, J. M. 271
 Moore, D. B. 89
 Mróz, Z. 391
 Murthy, M. V. V. 683

 Needleman, A. 835
 Nelson, C. A. 619, 637
 Niordson, F. I. 947
 Nix, W. D. 881, 1287
 Nowell, D. 105
 Nowinski, J. L. 381

 Ong, T. G. 331

 Ortiz, M. 231
 Östlund, S. 1141

 Panagiotopoulos, P. D. 1177
 Panayotounakos, D. E. 1179
 Pandya, B. N. 1267
 Parnes, R. 761
 Paydar, N. 313
 Pereira, N. Z. 211
 Pietruszczak, S. 705

 Rajapakse, R. K. N. D. 139, 963, 1205
 Ramnath, V. 439
 Rong, T.-Y. 1131
 Rozvany, G. I. N. 331
 Rychter, Z. 537

 Salkind, M. J. 1081
 Schwer, L. E. 817
 Seaman, L. 735
 Shah, A. H. 1205
 Shieh, J.-A. 1059
 Shindo, Y. 1193
 Sih, G. C. 757
 Sikarskie, D. L. 1
 Sotiropoulos, D. A. 165
 Sridharan, S. 481
 Srinivasan, M. A. 723
 Steif, P. S. 789
 Sundara Raja Iyengar, K. T. 683

 Taber, L. A. 973
 Tai, W. H. 1045
 Takabatake, H. 1003
 Theocaris, P. S. 1179
 Ting, T. C. T. 65
 Tirosh, J. 567

 Urgueira, A. P. V. 271

 Vable, M. 1

 Wang, A. S. D. 1081
 Watts, H. A. 77
 Wu, K.-C. 805

 Xu, J. 915

 Yang, I.-H. 1059
 Yep, K. M. 331
 Yu, T. X. 497

 Zhang, Ch. 41
 Zhang, L. C. 497
 Zhang, Z.-G. 1071
 Zubelwicz, A. 659