# Journal of the

## STRUCTURAL DIVISION

## Proceedings of the American Society of Civil Engineers

# STRUCTURAL DIVISION EXECUTIVE COMMITTEE

Henry J. Degenkolb, Chairman; Lynn S. Beedle, Vice-Chairman; Theodore R. Higgins; Bruce G. Johnston; Jack G. Bouwkamp, Secretary; Ralph B. Peck, Board Contact Member

### COMMITTEE ON PUBLICATIONS

Gerald F. Borrmann, Chairman; Glen V. Berg; Freeman P. Drew; Herbert M. Glen; John D. Haltiwanger; Francis J. Hanrahan; H. A. Miklofsky; William G. Murphy; Raymond C. Reese; Henry J. Degenkolb, Executive Committee Contact Member

#### CONTENTS

June, 1964

## Papers

	Page
Aeroelastic Vibration of a Steel Arch by Richard R. Bradshaw	1
Structural Analysis of Multistory Buildings by Ray W. Clough, Ian P. King, and Edward L. Wilson	19
Moment Equations for Computer Analysis of Frames by Semih S. Tezcan	35
Behavior of Hybrid Beams Subjected to Static Loads by Ronald W. Frost and Charles G. Schilling	55
Cable Movements Under Two-Dimensional Loads by W. Terence O'Brien and Arthur J. Francis	89

Copyright 1964 by the American Society of Civil Engineers.

Note.—Part 2 of this Journal is the 1964-29 Newsletter of the Structural Division.

The three preceding issues of this Journal are dated December, 1963, February, 1964, and April, 1964.

	Page
Computer Systems for Matrix Operations by Herbert Rothman and Peter Reilly	125
Reinforcement Requirements for Girder Web Openings by Edmund P. Segner, Jr.	147
Analysis of Short Span Folded Plates by Kaveti Seetharamulu and Mangesh G. Kulkarni	165
Optical Tooling for Precise Structural Measurements by Gerald C. Ward and John F. Ely	179
Lateral Stability of Glued Laminated Beams by R. F. Hooley and B. Masden	201
Strength of Elastically Stabilized Beams by Robert W. Haussler	219
Dynamic Plastic Analysis of Steel Frames by Barry Rawlings	265
Interaction of Shear Walls and Frames by Fazlur R. Khan and John A. Sbarounis	285
DISCUSSION	
Direct Design of Plate and Steel Structures, by John F. Brotchie. (December, 1962. Prior discussion: June, October, 1963. Discussion closed.) by John F. Brotchie (closure)	339
Deflection and Slope of Beams with Varying I, by Otakar Ondra. (February, 1963. Prior discussion: June, October, December, 1963. Discussion closed.) by Otakar Ondra (closure)	349
Effects of Cold-Straining on Structural Sheet Steels, by Alexander Chajes, S. J. Britvec, and George Winter. (April, 1963. Prior discussion: October, December, 1963. Discussion closed.) by Alexander Chajes, S. J. Britvec, and George Winter (closure)	343
Simplified Formulation of Stiffness Matrices, by Peter M. Wright. (April, 1963. Prior dis- cussion: December, 1963. Discussion closed.) by Peter M. Wright (closure)	375
Matrix Solution of Force Relaxation Method, by Chuan C. Feng. (June, 1963. Prior dis- cussion: February, 1964. Discussion closed.) by Chuan C. Feng (closure)	377
~ J chair c. I chg (clobule)	011

	Page
Behavior of Prestressed Composite Steel Beams, by Peter G. Hoadley. (June, 1963. Prior discus- sion: December, 1963, February, 1964. Discussion closed.) by Peter G. Hoadley (closure)	<b>3</b> 79
Optimum Solution Techniques for Finite-Difference Equations, by Richard N. White. (August, 1963. Prior discussion: None. Discussion closed.) errata	381
Consistent Mass Matrix for Distributed Mass Systems, by John S. Archer. (August, 1963. Prior discussion: None. Discussion closed.) errata	383
Analysis of Prestressed Cylindrical Shell Roofs, by Ryszard Dabrowski. (October, 1963. Prior discussion: None. Discussion closed.) by Alexander C. Scordelis and B. W. Smith by Ryszard Dabrowski (closure)	385 390
Analysis of Orthotropic Plate Bridges, by Rodney J. Clifton, Jerry C. L. Chang, and Tung Au. (October, 1963. Prior discussion: February, April, 1964. Discussion closed.) by Roman Wolchuk	393
Eigen-Matrix Method for Beams and Plates, by Bennosuke Tanimoto. (October, 1963. Prior discussion: April, 1964. Discussion closed.) by Thomas J. Higgins	403
Inelastic Lateral Buckling of Beams, by Theodore V. Galambos. (October, 1963. Prior discussion: None. Discussion closed.) errata	405
Matrix Analysis of Semi-Rigidly Connected Frames, by G. R. Monforton and T. S. Wu. (December, 1963. Prior discussion: April, 1964. Discussion closed.) by J. M. Howe	407
Structure Designs Governed by Limited De- formations, by Jacob Solomon. (December, 1963. Prior discussion: None. Discussion closed.) by J. W. Crossett	411
Philosophy of Engineering Design of Structures, by Malcolm S. Gregory. (December, 1963. Prior discussion: None. Discussion closed.) by Douglas H. Merkle	413

	1 age
Plastic Analysis of Circular Balcony Girders, by Kuang-Han Chu and Arthur Thelen. (Decem- ber, 1963. Prior discussion: None. Discussion closed.) by Le-Wu Lu	415
Long Bolted Joints, by Robert A. Bendigo, Roger M. Hansen, and John L. Rumpf. (Decem- ber, 1963. Prior discussion: None. Discussion closed.)	
by A. J. Francis	417
Phase I Report on Folded Plate Construction, Report of the Task Committee on Folded Plate Construction of the Committee on Masonry and Reinforced Concrete. (December, 1963. Prior discussion: April, 1964. Discussion closed.)	
by A. D. Dyles	421