## **CONTENTS**

Papers	Page
HOW SAFE ARE YOUR TOWERS? by Joseph R. Arena	1
PLASTIC DESIGN OF MULTISTORY FRAMES BY COMPUTER by George C. Driscoll, Jr., James O. Armacost, III, and William C. Hansell	17
POINT-MATCHING ANALYSIS OF CURVED TIMBER BEAMS by Ricardo O. Foschi	35
EFFICIENT SOLUTIONS FOR LINEAR MATRIX EQUATIONS by H. Gordon Jensen and Gary A. Parks	49
ANALYTICAL STUDY OF TUBULAR TEE-JOINTS by Alexander C. Scordelis and Jack G. Bouwkamp	65
SPANDREL-SLAB INTERACTION by Mario G. Salvadori	89
MATRIX FORCE ANALYSIS OF THIN-WALLED STRUCTURES by Dusan Krajcinovic	107
(over)	

This Journal is published monthly by the American Society of Civil Engineers. Publications office is at 2500 South State Street, Ann Arbor, Michigan 48104. Address all ASCE correspondence to the Editorial and General Offices at 345 East 47th Street, New York, N.Y. 10017. Allow six weeks for change of address to become effective. Subscription price is \$20.00 per year with discounts to members and libraries. Second-class postage paid at Ann Arbor, Michigan. ST.

## DISCUSSION

## Proc. Paper 6990

STRENGTH AND BEHAVIOR OF AN INELASTIC HYBRID FRAME, by Peter Arnold, Peter F. Adams and Le-Wu Lu (Jan., 1968. Prior Discussions: Nov., 1968).	
closure	125
GRID MOMENT MAXIMIZATION BY MATHEMATICAL PRO- GRAMMING, by Francois N. Ayer and C. Allin Cornell (Feb., 1968. Prior Discussion: Jan., 1969).	126
LONGITUDINALLY RESTRAINED REINFORCED CONCRETE BEAMS, by German Gurfinkel and Chester P. Siess (March, 1968. Prior Discussions: Jan., 1969).	
closure	126
DESIGN OF HYBRID STEEL BEAMS, by the Subcommittee 1 on Hybrid Beams and Girders, Joint ASCE-AASHO Committee on Flexural Members (June, 1968. Prior Discussion: March, 1969).	100
closure	<b>12</b> 8
PROBABILISTIC STRUCTURAL ANALYSIS AND DESIGN, by Jack R. Benjamin (July, 1968. Prior Discussions: March, April, July, 1969).	
closure	129
LAMINATED WOOD BEAMS REINFORCED WITH STEEL STRIPS, by Karl B. Borgin, Gerrit F. Loedolff and Gerald R. Saunders (July, 1968. Prior Discussions: March, 1969).	
closure	131
FINITE ELEMENT ANALYSIS OF NONLINEAR STRUCTURES, by Robert H. Mallett and Pedro V. Marcal (Sept., 1968. Prior Discussions: June, 1969).	
closure and errata	132
BUCKLING ANALYSIS OF ONE-STORY FRAMES, by Alfred Zweig (Sept., 1968. Prior Discussions: May, July, 1969).	
closure	133
MECHANISMS OF SHEAR RESISTANCE OF CONCRETE BEAMS, by R. C. Fenwick and Thomas Paulay (Oct., 1968. Prior Discussion: July, 1969).	
closure	135

	Page
SHEAR FLEXIBILITY AND STRENGTH OF CORRUGATED DECKS, by Eric R. Bryan and Wagih M. El-Dakhakhni (Nov., 1968. Prior Discussions: June, 1969).  closure and errata	135
INELASTIC BAR SUBJECTED TO THRUST AND CYCLIC BENDING, by Ben Kato and Hiroshi Akiyama (Jan., 1969).  errata	137
CYCLIC YIELD REVERSAL IN STEEL BUILDING CONNECTIONS, by Egor P. Popov and R. Bruce Pinkney (March, 1969).  by William P. Vann	137
NEW RECTANGULAR FINITE ELEMENT FOR SHEAR WALL ANALYSIS, by Iain A. MacLeod (March, 1969. Prior Discussion: Sept., 1969).	140
by Gordon M. Pole	140 143
Omid'varan (March, 1969).  errata	147
RESIDUAL STRESS MEASUREMENT IN TUBULAR MEMBERS, a by Donald R. Sherman (April, 1969). by Anatol A. Eremin	147
EFFICIENT SOLUTION OF LOAD-DEFLECTION EQUATIONS, a by Robert J. Melosh and Robert M. Bamford (April, 1969. Prior Discussions: Dec., 1969).	
by Vipperla B. Venkayya	148 152
PONDING OF LIQUIDS ON FLAT ROOFS, by James Chinn, Abdulwahab H. Mansouri and Staley F. Adams (May, 1969). by C. S. Pandit	153
CONVERGENCE OF HYPAR FINITE-DIFFERENCE SOLU- TIONS, a by J. G. A. Croll and J. C. Scrivener (May, 1969). by Salman H. Abu-Sitta	154
HORIZONTALLY CURVED GIRDERS—STATE OF THE ART, a by Paul F. McManus, Ghulam A. Nasir and Charles G. Culver (May, 1969. Prior Discussions: Nov., Dec., 1969).	
by William N. Poellot, Jr	157
by Asadour H. Hadjian	159

a Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.

	Page
BUCKLING OF RIGIDLY-JOINTED PLANE TRUSSES, by Adel Helmy Salem (June, 1969).  by John E. Goldberg	161
DEFORMATIONS OF GEOMETRICALLY IMPERFECT BEAMS, a by Nicholas S. Trahair (July, 1969).  by Joseph A. Yura	162
ULTIMATE CAPACITY OF SINGLE BOLTED ANGLE CON- NECTIONS, by John B. Kennedy and George R. Sinclair (August, 1969).	
by Cedric Marsh	164
GUIDE FOR THE DESIGN OF ALUMINUM FORMED-SHEET BUILDING SHEATHING, <sup>a</sup> by the Task Committee on Light- weight Alloys of the Committee on Metals of the Structural Division (August, 1969).  by Herbert S. Saffir	165
LIMIT ANALYSIS OF STRUCTURES, a by Dusan Krajcinovic	
(September, 1969). by Morris Ojalvo	165
TECHNICAL NOTE	
Proc. Paper 7025	
MAXIMIZATION OF EIGENVALUES BY CONJUGATE GRADIENTS by Carlos A. Prato	171

## INFORMATION RETRIEVAL

The key words, abstract, and reference "cards" for each article in this Journal represent part of the ASCE participation in the EJC information retrieval plan. The retrieval data are placed herein so that each can be cut out, placed on a 3 x 5 card and given an accession number for the user's file. The accession number is then entered on key word cards so that the user can subsequently match key words to choose the articles he wishes. Details of this program were given in an August, 1962 article in CIVIL ENGINEERING, reprints of which are available on request to ASCE headquarters.

<sup>&</sup>lt;sup>a</sup> Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.