## **CONTENTS**

Papers	Page
LAGRANGIAN FORMULATION OF STATICS OF SHELLS by Jagannath P. Shrivastava and Peter G. Glockner	547
STOCHASTIC FRAME RESPONSE USING MODAL TRUNCATION by Gary C. Hart	565
LIFT-OSCILLATOR MODEL OF VORTEX-INDUCED VIBRATION by Ronald T. Hartlen and Iain G. Currie	577
ANALYSIS OF DYNAMIC RESPONSE OF HIGHWAY BRIDGES by Anestis S. Veletsos and Tseng Huang	593
OPTIMUM STIFFNESS AND STRENGTH OF ELASTIC STRUCTURES by Ernest F. Masur	621
IMPACT OF SPHERES ON ICE by Yin-Chao Yen, Fuat Odar and Lynnwood R. Bracy	641
CYLINDRICAL SHELL SUBJECT TO LONGITUDINAL LINE LOAD by Amir K. Naghdi	653
DYNAMIC ANALYSIS OF INELASTIC SPACE FRAMES by Robert K. Wen and Fereydoon Farhoomand	667
YIELDING IN FRAMED STRUCTURES UNDER DYNAMIC LOADS by Navin C. Nigam	687
(over)	

This Journal is published bimonthly 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 \$10.00 per year with discounts to members and libraries. Second-class postage paid at Ann Arbor, Michigan. EM, SA, SM.

	Page
LIMIT ANALYSIS OF PLATES UNDER COMBINED LOADS by Kenneth W. Neale and Niels C. Lind	711
MAXIMUM STRUCTURAL RESPONSE TO SEISMIC EXCITATIONS by Masanobu Shinozuka	729
YIELD AND FAILURE OF GLASS-EPOXY COMPOSITES by Ori Ishai, Arlo E. Moehlenpah and Aaron Preis	739
STABILITY OF HYPERBOLOIDAL COOLING TOWER by Henry L. Langhaar, Arthur P. Boresi, Robert E.	753
Miller and Jerry J. Bruegging	193
DISCUSSION	
Proc. Paper 7574	
<del></del>	
OVERALL AND LOCAL BUCKLING OF CHANNEL COLUMNS, by Ahmed A. Ghobarah and Wai K. Tso (Apr., 1969. Prior Discussions: Dec., 1969, Feb., 1970).	
closure	783
FRACTURE MECHANISM IN CONCRETE: HOW MUCH DO WE KNOW? by Sánder Popovics (June, 1969. Prior Discussions: Feb., Apr., 1970).	<b>-</b> 0
closureVALIDITY OF STOKES THEORY FOR ACCELERATING	785
SPHERES, by Lyle F. Mockros and Robert Y. S. Lai (June, 1969. Prior Discussions: Apr., 1970).	
closure	786
PARAMETRIC VIBRATION RESPONSE OF COLUMNS, by Thomas L. Anderson and Martin L. Moody (June, 1969. Prior Discussion: Apr., 1969).	
closure	787
SHELLS OF REVOLUTION WITH CONCENTRATED EDGE FORCES, by David G. Elms (June, 1969. Prior Discussions: Dec., 1969).	
closure	788
CROSS-VELOCITY BEHAVIOR IN PARALLEL CHANNEL FLOW, by James F. Wilson (Aug., 1969. Prior Discussions: Feb., 1970).	
closure	789

	Page
APPROXIMATE YIELD SURFACE EQUATIONS, by Glenn A. Morris and Steven J. Fenves (Aug., 1969. Prior Discussions: Apr., 1970). closure	790
DYNAMIC RESPONSE OF INITIALLY-STRESSED MEM- BRANE SHELLS, by John W. Leonard (Oct., 1969). errata	791
CAPILLARITY AND SEEPAGE FROM AN ARRAY OF CHANNELS, by John C. Bruch, Jr. (Dec., 1969).	792
THREE-DIMENSIONAL BAR CELL FOR ELASTIC STRESS ANALYSIS, a by Alexander Hrennikoff and A. Gantayat (June, 1970).  by Krishna M. Agrawal	792
TECHNICAL NOTE	
Proc. Paper 7573	
INTERNAL HYDRAULIC JUMP IN CO-CURRENT STRATI-	797
by Norio Hayakawa	797
by Chi Chao Tung	801

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