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CONTENTS

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Note.--Part 2 of this Journal is the 1963-8 Newsletter of the Engineering Mechanics Division.

The three preceding issues of this Journal are dated August 1962, October 1962, and December 1962.

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## DISCUSSION

KEY WORDS: plates; deflection; elasticity; foundations

ABSTRACT: The evaluation of moderately large deflections of uniformly loaded plates on elastic foundations of the Winkler type is presented using Berger's approximation, which neglects the strain energy due to the second invariant of the middle surface strains. Because of this approximation, the problem may be formulated in terms of two decoupled nonlinear equations. Series solutions are obtained for circular and rectangular plates under various support conditions, and are numerically evaluated and presented in the form of graphs for plates of various aspect ratios with simply supported edges. Results obtained are compared with some known solutions, and it is concluded that Berger's approximate method yields results of sufficient accuracy for practical purposes.

REFERENCE: "Large Deflections of Plates on Elastic Foundations," by S. N. Sinha, Journal of the Engineering Mechanics Division, ASCE, Vol. 89, No. EM1, Proc. Paper 3416, February, 1963, pp. 1-24.

KEY WORDS: cylinders; piles; oscillation; water flow; waves; hydrodynamics; vibration

ABSTRACT: Drag, lift, and moment on twenty-four parallel vertical 1/2-in. cylinders oscillating with 13-in. amplitude in water were measured in a laboratory tank 5.5 ft by 16 ft. A comparison, $D_O$, is defined as 24 times the calculated drag on one of the cylinders alone in a uniform stream flowing at the maximum velocity of the group oscillation. Drag increases from 0.3 $D_O$, with cylinders in contact, to 0.9 $D_O$ at 4 diameter spacing, and to approximately $D_O$ at 8 diameters. At small spacings, lift decreases from approximately $D_O$ to 0.3 $D_O$ as Reynolds numbers increase from 5,000 to 15,000. At 2.8 to 8 diameters spacing, lift reaches the large value of 1.7 $D_O$ for the higher Reynolds numbers. Moments about the vertical axis of the group are 1 to 9 times the product of $D_O$ and the group radius. Vibration frequencies in all modes are at natural frequencies of the group in its corresponding modes. Staggered and square cylinder patterns give approximately the same results.

REFERENCE: "Groups of Vertical Cylinders Oscillating in Water," by A. D. K. Laird and R. P. Warren, Journal of the Engineering Mechanics Division, ASCE, Vol. 89, No. EM 1, Proc. Paper 3422, February, 1963, pp. 25-35.

KEY WORDS: elasticity; buckling; plates; stability

ABSTRACT: Critical values of the middle plane forces for equilateral triangular plates that are determined for the clamped and simply supported edge conditions and for the cases of force parallel or perpendicular to a base show that accurate values for the lower modes of buckling may be obtained with relatively coarse grids and extrapolations. In certain cases, the pattern of convergence of the extrapolated values indicates the possibility of establishing bounds on the critical load values. In computing these, values, finite difference approximations to the governing differential equations are used. Four different approximations to the biharmonic operator are used, and solutions for the critical loads and corresponding mode shapes using several different grid spacings are obtained. The extrapolated values of the buckling loads may also be found. The use of successively finer grids results in convergence for the values of lowest critical load.

REFERENCE: "Stability of Equilateral Triangular Plates," by William A. Bradley, Journal of the Engineering Mechanics Division, ASCE, Vol. 89, No. EM1, Proc. Paper 3426, February, 1963, pp. 37-56.

KEY WORDS: atomic blast; shelters; rayleigh waves; computer; pressure distribution

ABSTRACT: Displacements due to Rayleigh waves are produced by nuclear bursts acting on the surface of a semi-infinite elastic half-space producing a time decaying pressure pulse that acts over a circular surface area of increasing radius. Expressions for the Rayleigh wave displacements produced by a concentrated load on the surface of the medium are used as influence functions to construct, by means of suitable integrations in space and time, the corresponding quantities produced by the pressure distributions from a nuclear burst. Numerical results and procedures are noted and the application of the method to the design of undergound facilities is outlined.

REFERENCE: "Elastic Rayleigh Wave Motions Due to Nuclear Blasts," by Melvin L. Baron and Ronald Check, Journal of the Engineering Mechanics Division, ASCE, Vol. 89, No. EM1, Proc. Paper 3432, February, 1963, pp. 57-70.