Dr. A.V. Viswanathan

Selected Publications:

Viswanathan, A. V., Soong, T. C., and Miller, R. E. Jr., "Buckling Analysis for Axially Compressed Flat Plates, Structural Sections, and Stiffened Plates Reinforced with Laminated Composites," NASA CR-1887, 1971.
Narasimhan, K. Y. and Hoff, N. J.: "Calculation of the Load Carrying Capacity of Initially Slightly Imperfect Thin Walled Cylindrical Shells." J. of Appl. Mech., Vol. 38, No.1, pp. 162-171, March 1971. doi:10.1115/1.3408738 (or the title is: "Snapping of Imperfect Thin-Walled Circular Cylindrical Shells of Finite Length")
ABSTRACT: The nonlinear partial differential equations of von Karman and Donnell governing the deformations of initially imperfect cylindrical shells are reduced to a consistent set of ordinary differential equations. A numerical procedure is then used to solve the equations together with the associated boundary conditions and to determine the number of waves at buckling as well as the load-carrying capacity of imperfect cylindrical shells of finite length subjected to uniform axial compression in the presence of a reduced restraint along the simply supported boundaries. It is found that details of the boundary conditions have little effect on the number of waves into which the shell buckles around the circumference. This number is determined essentially by the length-to-radius and radius-to-thickness ratios. The absence of an edge restraint to circumferential displacement reduces the classical value of the buckling load by a factor of about two. On the other hand, shells with these boundary conditions appear to be less sensitive to initial imperfections in the shape, and thus the maximal load supported in the presence of unavoidable initial deviations can be the same for shells with and without a restraint to circumferential displacements along the edges.

A.V. Viswanathan, T.C. Soong and R.E. Miller Jr (Stress Analysis Research, The Boeing Company, Seattle, Washington 98124, U.S.A.), "Compressive buckling analysis and design of stiffened flat plates with multilayered composite reinforcement", Computers & Structures, Vol. 3, No. 2, March 1973, pp. 281-297, doi:10.1016/0045-7949(73)90018-7
ABSTRACT: This paper describes an analysis and its application in design for compressive buckling of flat stiffened plates considered as an assemblage of linked orthotropic flat plate and beam elements. Plates can be multilayered, with possible coupling between bending and stretching. Structural lips and beads are idealized as beams. The plate and the beam elements are matched along their common junctions for displacement continuity and force equilibrium in an exact manner. Buckling loads are found as the lowest of all possible general and local failure modes. The mode shape is used to determine whether buckling is a local or general instability and is particularly useful to the designer in identifying the weak elements for redesign purposes. Typical design curves are presented for the initial buckling of a hat stiffened plate locally reinforced with boron fiber composite.

Viswanathan, A.V., and Tamekani, M., Elastic Buckling Analysis for Composite Stiffened Panels and Other Structures Subjected to Biaxial Inplane Loads, NASA CR-2216, September 1973.
Almroth's comments: The computer program BUCLISP 2 for buckling of panels and including composite material is described. The program applies to cases in which it can be assumed that the buckling mode in the direction of the stiffeners is sinusoidal. Some numerical results are presented. These include some comparisons to analytical solutions. Special problems considered are comparison between bonded and riveted structures and the effects of boron fiber reinforcement of titanium panels.

Viswanathan, A. V., Tamekuni, M., and Tripp, L. L., Elastic Stability of Biaxially Loaded Longitudinally Stiffened Composite Structures, AIAA J., Vol. 11, pp. 1553-1559, November 1973.

Tripp. L. L., Tamekuni, M. and Viswanathan, A.V., "User's Manual – BUCLASP 2: A computer program for instability analysis of biaxially loaded composite stiffened panels and other structures", NASA CR-112226, 1973

Viswanathan, A. V., Tamekuni, M., and Baker, L. L., Elastic Stability of Laminated, Flat and Curved, Long Rectangular Plates Subjected to Combined Inplane Loads, NASA CR-2330, June 1974.
Almroth's comments: Some numerical results from BUCLAP2 on the buckling of long laminated plates are presented. A warning is included that the "reduced bending stiffness method" (Reference A-7) does not always give good results.