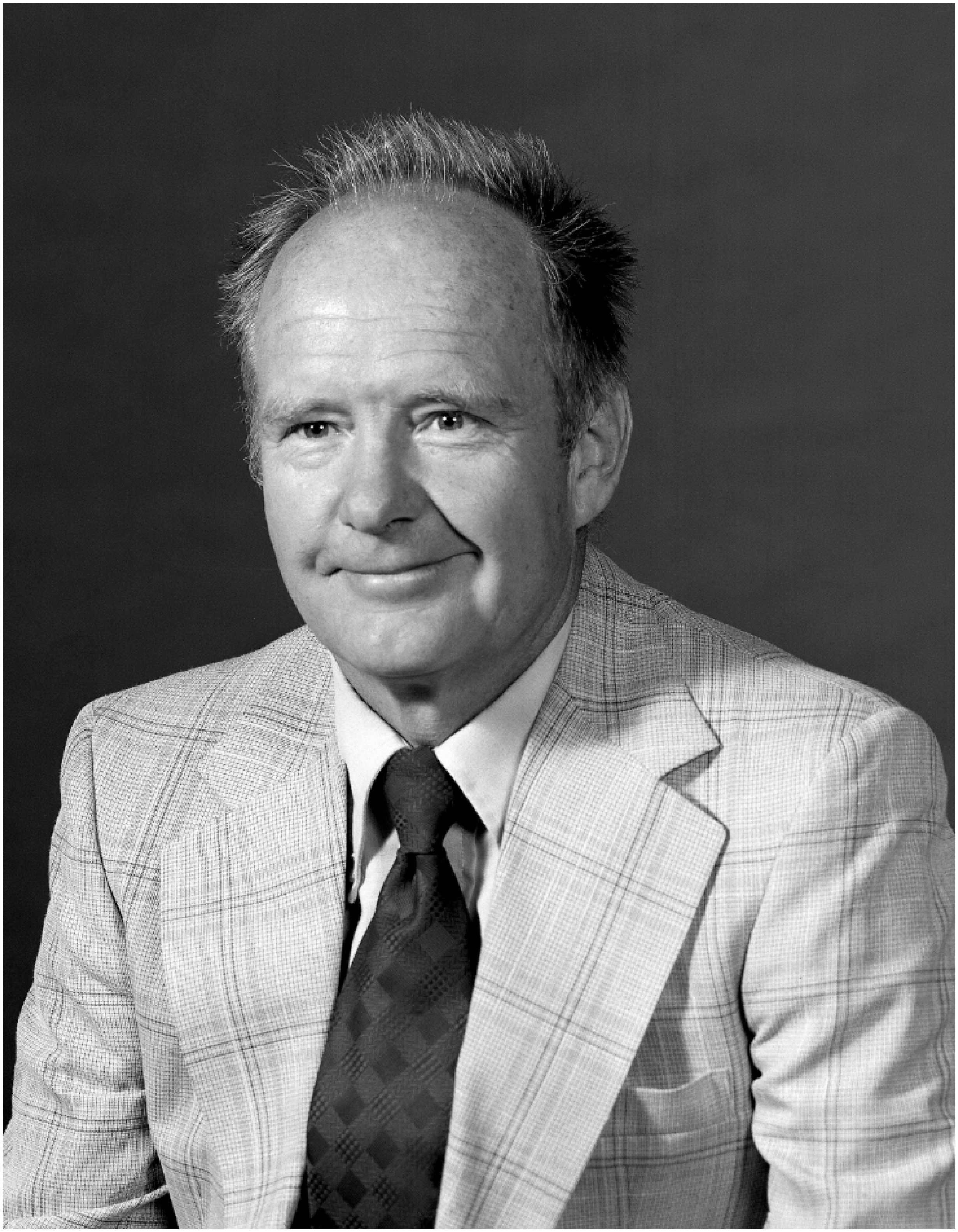

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Selected Publications:

Anderson, M. S. (1962). Combination of temperature and axial compression required for buckling of a ring stiffened cylinder. TN D-121, NASA.

Anderson, M. S. and Card, M. F., "Buckling of Ring-Stiffened Cylinders Under a Pure Bending Moment and a Nonuniform Temperature Distribution," NASA TN D-1513, 1962.

Walter L. Heard, Jr. (1), Melvin S. Anderson (1), and Paul Slysh (2)
(1) NASA Langley Research Center, Hampton, VA),
(2) General Dynamics Corporation, Convair Division, San Diego, California
"An engineering procedure for calculating compressive strength of isogrid cylindrical shells with buckled skin", NASA TN D-8239, June 1976
ABSTRACT: An engineering procedure is presented for calculating the compressive buckling strength of isogrid cylinders using shell-of-revolution techniques and accounting for loading behond the material proportional limit and/or local buckling of the skin prior to general buckling. A general nondimensional chart (based on a nonlinear postbuckling analysis of a typical skin element) is presented which can be used in conjunction with formulas based on simple deformation plasticity theory to calculate postbuckling stiffnesses of the skin. The stiffening grid system is treated as an equivalent isotropic grid layer. Stiffnesses are determined for this grid layer, when loaded beyond the proportional limit, by the same plasticity theory used for the skin and a nonlinear stress-strain curve constructed from simple isogrid-handbook formulas and standard-reference-manual stress-strain curves for the material involved. Comparison of prebuckling strains and buckling results obtained by this procedure with data from a large isogrid-cylinder test is excellent, with the calculated buckling load no more than 4 percent greater than the test value.

Noor, A. K., Mathers, M. D., and Anderson, M. S., Exploiting Symmetries for Efficient Postbuckling Analysis of Composite Plates, AIAA J., Vol. 15, pp. 24-32, January 1977.
Almroth's comments: The paper is primarily concerned with computer economy. In regard to the effects of transverse shear deformation, it is noted that this effect in the postbuckling range is similar to its effect on the buckling load. That is, it should be included for a typical (simply supported plate) if $h/b > 0.05$.

Williams, J. G., Anderson, M. S., Rhodes, M. D., Starnes, J. H., Jr., and Stroud, W. J.: Recent Developments in the Design, Testing, and Impact-Damage Tolerance of Stiffened Composite Panels. NASA TM-80077, 1979.

Stroud, W. J., Anderson, M. S., and Hennessy, K. W., Effect of Bow-Type Initial Imperfections on the Buckling Load and Mass of Graphite-Epoxy Blade-Stiffened Panels, NASA TM-74063, August 1977.
Almroth's comments: Blade-stiffened composite material panels under axial compression are designed for minimum weight with buckling constraints. The bending stresses due to a bow-type imperfection are included. It is found that the weight efficiency is much better if the imperfection is allowed to affect the optimized design.
Authors' ABSTRACT: A structural synthesis computer code which accounts for first order effects of an initial bow and which can be used for sizing stiffened composite panels having an arbitrary cross section is used to study graphite blade-stiffened panels. The effect of a small initial bow on both the load carrying ability of

panels and on the mass of panels designed to carry a specified load is examined. Large reductions in the buckling load caused by a small initial bow emphasize the need for considering a bow when a panel is designed.

M.S. Anderson, R.E. Fulton, W.L. Heard Jr. and J.E. Walz (NASA Langley Research Center, Hampton, Virginia 23365, U.S.A.), “Stress, buckling, and vibration analysis of shells of revolution”, Computers & Structures, Vol. 1, Nos. 1-2, August 1971, pp. 157-192, doi:10.1016/0045-7949(71)90009-5
ABSTRACT: This paper summarizes the major computer programs in existence for the analysis of shells of revolution by numerical integration and finite difference procedures. The report describes programs for (1) linear and nonlinear analysis of shells subjected to axisymmetric and asymmetric static loads, (2) buckling and vibration behavior including effects of axisymmetric nonlinear prestress, and (3) transient response. Extensions of these programs which are currently underway and some of the primary assets of both the numerical integration and finite difference procedures are discussed. In addition, a summary of the shell theory formulation, the numerical approximation, and the solution techniques of a set of programs denoted SALORS (Structural Analysis of Layered Orthotropic Ring-Stiffened Shells), developed at the NASA Langley Research Center, are described. Stress, vibration, and buckling results from the SALORS program are given for several shell configurations having a variety of structural complexities that illustrate the current capability of shell of revolution programs.

Leonard, R. W., Anderson, M. S., and Heard, W. L. Jr., "Design of a Mars Entry Aeroshell," Buckling of Structures (IUTAM Symposium, Cambridge, Mass., June 1974), Springer-Verlag, Berlin, Heidelberg, New York, 1976, pp. 346-364.

Anderson, M. S. and Stroud, W. J., "General Panel Sizing Computer Code and its Application to Composite Structural Panels," AIAA Journal, Vol. 17, Aug. 1979, pp. 892-897.

Nemeth, M. P.; and Anderson, M. S.: Axisymmetric Shell Analysis of the Space Shuttle Solid Rocket Booster Field Joint. NASA TP-3033, Jan. 1991.

Nemeth, M. P.; and Anderson, M. S.: Axisymmetric Shell Analysis of the Space Shuttle Solid Rocket Booster Field Joint. J. Spacecr. & Rockets, vol. 27, no. 1, Jan.–Feb. 1990, pp. 85–92.

Williams FW, Kennedy D, Butler R and Anderson MS. VICONOPT: program for exact vibration and buckling analysis or design of prismatic plate assemblies. AIAA Journal, Vol. 29, No. 11, pp 1927- 1928, 1991.

F. W., Kennedy, D., Anderson, M.S., "Analysis features of VICONOPT, an exact buckling and vibration program for prismatic assemblies of anisotropic plates,", AIAA Paper 90-0970-CP, Proceedings 31st AIAA/ASME Structures, Structural Dynamics, and Materials Meeting, pp 920-929, 1990.

W. J. Stroud, Nancy Agranoff, and Melvin S. Anderson (NASA Langley Research Center, Hampton, Virginia), “Minimum-Mass Design of Filamentary Composite Panels Under Combined Loads: Design Procedure Based on a Rigorous Buckling Analysis”, NASA Technical Note TN D-8417, July 1977, Accdession Number: ADA301714, Handle / proxy Url : http://handle.dtic.mil/100.2/ADA301714,
ABSTRACT: A procedure is presented for designing uniaxially stiffened panels made of composite material and subjected to combined inplane loads. The procedure uses a rigorous buckling analysis and nonlinear mathematical programing techniques. Design studies carried out with the procedure consider hat-stiffened and corrugated panels made of graphite-epoxy material. Combined longitudinal compression and shear and

combined longitudinal and transverse compression are the loadings used in the studies. The capability to tailor the buckling response of a panel (i.e., design a panel so that it will have specified buckling loads at various buckling wavelengths) is also explored. Finally, the adequacy of another, simpler, analysis-design procedure is examined. The report demonstrates that a panel design procedure with a high-quality buckling analysis and with complete generality of constraints is practical. Such a procedure can be used to avoid failure from complex buckling modes and to determine mass and proportions of panels for multiple design load conditions and constraints.

Anderson, Melvin S., Hennessy, Katherine W. and Heard, Walter L., Jr., “Addendum to User’s guide to VIPASA (Vibration and Instability of Plate Assemblies Including Shear and Anisotropy)”, NASA TM X-73914, 1976

W.J. Stroud and M.S. Anderson (NASA Langley Research Center, Hampton, Virginia, USA), “PASCO: Structural panel analysis and sizing code, capability and analytical foundations”, 1980 (publisher not given; perhaps a NASA Technical Note?, ProQuest-CSA)
ABSTRACT: A computer code denoted PASCO which can be used for analyzing and sizing uniaxially-stiffened composite panels is described. Buckling and vibration analyses are carried out with a linked-plate analysis computer code denoted VIPASA, which is incorporated in PASCO. Sizing is based on nonlinear mathematical programming techniques and employs a computer code denoted CONMIN, also incorporated in PASCO. Design requirements considered are initial buckling, material strength, stiffness, and vibration frequency. The capability of the PASCO computer code and the approach used in the structural analysis and sizing are described.

(**A**) Anderson, M.S. and Stroud, W.J., "General panel sizing computer code and its application to composite structural panels," AIAA Journal, 17, (1979) pp. 892-897. Also see: (**B**) Stroud, W.J. and Anderson, M.S., "PASCO: Structural panel analysis and sizing code, capability and analytical foundations," NASA TM-80181, NASA Langley Research Center, Hampton, Va., 1981; (**C**) Stroud, W.J., Greene, W.H., and Anderson, M.S., "Buckling loads of stiffened panels subjected to combined longitudinal compression and shear: Results obtained with PASCO, EAL, and STAGS computer programs," NASA TP 2215, Nasa Langley Research Center, Hampton, Va., January 1984.

McGowan, D. M., and Anderson, M. S., “Development of Curved Plate Elements for the Exact Buckling Analysis of Composite Plate Assemblies Including Transverse Shear Effects,” Proceedings of the 38th AIAA/ ASME/ ASCE/ AHS/ ASC Structure, Structural Dynamics and Materials Conference, AIAA Paper 97-1305, Kissimmee, Florida, USA, April 1997, pp. 2678-2692.

Stroud, W. J., Greene, W. H., and Anderson, M. S., “Buckling Loads of Stiffened panels subjected to combined longitudinal compression and shear: results obtained with PASCO, EAL and STAGS computer programs,” NASA TP-2215, 1984.

Williams, F. W., and Anderson, M. S., “Incorporation of Lagrange Multipliers into an Algorithm for Finding Exact natural Frequencies or Critical Buckling Loads,” International Journal of Mechanical Sciences, Vol. 25, No. 8, 1993, pp. 579-584.

Anderson, M. S. and Kennedy, D. Transverse shear deformation in exact buckling and vibration analysis of composite plate assemblies. AIAA J., 1993, 31(10), 1963-1965.

Williams, F. W., Kennedy, D., and Anderson, M. S., “Analysis Features of VICONOPT, an Exact Buckling and Vibration Program for Prismatic Assemblies of Anisotropic Plates,” AIAA Paper 90-0970, Proceedings of the 31st AIAA / ASME/ ASCE/ AHS/ ASC Structures, Structural Dynamics and Materials Conference, Long Beach, California, 1990, pp. 920-929.

Williams, F.W., Kennedy, D., Butler, R., and Anderson, M. S. VICONOPT: program for exact vibration and buckling analysis or design of prismatic plate assemblies. AIAA J., 1991, 29(11), 1927-1928.

Anderson, M. S. Design of panels having postbuckling strength, AIAA-97-1240-CP (1997).

Anderson, M.S., "Nonlinear and Tangent Stiffness of Imperfect Beam Columns," NASA TM 84497, Dec. 1982.

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(3) British Aerospace, Bristol BS99 7AR, England
“Buckling and vibration of any prismatic assembly of shear and compression loaded anisotropic plates with an arbitrary supporting structure”, International Journal of Mechanical Sciences, Vol. 25, No. 8, 1983, pp. 585-596, doi:10.1016/0020-7403(83)90050-4
ABSTRACT: The VIPASA computer program accurately treats buckling and vibration of prismatic plate assemblies with a response that varies sinusoidally in the longitudinal direction. In-plane shear loading of component plates produces skewed mode shapes that do not conform to desired support conditions, and this has placed a limitation on the general applicability of VIPASA. This problem is overcome in the present paper by coupling the VIPASA stiffness matrices for different wavelength responses through the method of Lagrangian Multipliers. Supports at arbitrary locations, including support provided by any elastic structure, are included in the theory. Examples illustrate the accuracy and convergence of the method and some of the principal features of the solution. The complete generality and capability of VIPASA have been retained in a computer program VICON that permits constraints and a supporting structure consisting of any number of transverse beam-columns.

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“Incorporation of Lagrangian Multipliers into an algorithm for finding exact natural frequencies or critical buckling loads”, International Journal of Mechanical Sciences, Vol. 25, No. 8, 1983, pp. 579-584, doi:10.1016/0020-7403(83)90049-8
ABSTRACT: An existing algorithm enables natural frequencies or critical load factors to be found with certainty when “exact” stiffness matrices are used. This algorithm is extended to permit Lagrangian Multipliers to be used to couple the “exact” stiffness matrices of component structures to represent connections between the structures. The new algorithm also permits coupling of the stiffness matrices for different assumed wavelengths of sinusoidal response of a given structure with the stiffness matrices of other structures to satisfy required constraint conditions. The algorithm applies to problems formulated using real or complex arithmetic.

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"Inclusion of elastically connected members in exact buckling and frequency calculations", Computers & Structures, Vol. 22, No. 3, 1986, pp. 395-397, doi:10.1016/0045-7949(86)90043-X
ABSTRACT: A standard stiffness matrix procedure which permits any combination of rigid, elastic, pinned or sliding connections of the degrees of freedom at the ends of a member to the nodes of its parent structure is described, in order to show how easily it can be extended to allow an existing algorithm to be used to ensure that no eigenvalues of the parent structure can be missed even when "exact" member theory is used. The eigenvalues are the natural frequencies of undamped free vibration analyses or the critical load factors of buckling problems. The method preserves the exactness of the member theory and an efficient method for computer application is indicated. The theory also permits any combination of rigid, elastic, pinned or sliding connections between the freedoms of a substructure and those of its parent structure.