Dr. David L. Block

Selected Publications:

Block, D. L. (NASA Langley Research Center, Hampton, Virginia, USA), "Influence of ring stiffeners on instability of orthotropic cylinders in axial compression", NASA TND-2482, October 1964
ABSTRACT: Calculations are presented from an analytical investigation on the influence of ring stiffeners on the instability modes of orthotropic cylinders subject to compressive or bending loads. The analysis is performed by employing small-deflection theory and by modifying the equilibium equations to include the effects of discrete ring stiffeners characterized by a bending stiffness that restrains radial deformation of the shell. These calculations indicate that the ring bending stiffness necessary to cause panel instability can be adequately determined by use of an analysis that does not include the discreteness of the rings. Comparison of the results of the calculations with an empirical ring design criterion in common use indicates that the empirical formula can be either very conservative or very nonconservative depending on the cylinder geometry.

David L. Block, Michael F. Card and Martin M. Mikulas, Jr., "Buckling of eccentrically stiffened orthotropic cylinders", NASA TN D-2960, NASA Langley Research Center, Hampton, Virginia, August, 1965,
proxy URL : http://handle.dtic.mil/100.2/ADA397543
ABSTRACT: A small-deflection theory for buckling of stiffened orthotropic cylinders that includes eccentricity (one-sided) effects in the stiffeners is derived from energy principles. Buckling solutions corresponding to classical simple- support boundary conditions are obtained for both orthotropic and isotropic stiffened cylinders subjected to any combination of axial and circumferential loading. Comparable solutions for stiffened flat plates are also given. Sample calculations of predicted compressive buckling loads obtained from the solutions are compared with existing solutions for ring-stiffened corrugated cylinders, ring-and-stringer-stiffened cylinders, and longitudinally (stringer) stiffened cylinders. The calculations demonstrate that eccentricity effects are large even with very large diameter cylinders of practical proportions and should be accounted for in any buckling analysis.

David L. Block, "Buckling of eccentrically stiffened orthotropic cylinders under pure bending", NASA Technical Note, March 1966, proxy URL : http://handle.dtic.mil/100.2/ADA307274
ABSTRACT: The stability of stiffened orthotropic cylinders that include the effects of eccentric stiffeners and are loaded with pure bending or any combination of bending and compression is investigated analytically by means of a small deflection theory. Solutions to the buckling equations are obtained for simple support boundary conditions by use of the Galerkin method. The pure bending buckling loads are compared with existing pure compression buckling loads for three contemporary cylinder configurations. Also shown are predicted buckling modes and typical interaction curves between bending and compression. The results show that eccentricity effects are substantial and that the maximum pure bending load may be as much as 40 percent greater than the pure compression load.

Block, D.L., "Influence of Prebuckling Deformations, Ring Stiffeners and Load Eccentricity on the Buckling of Stiffened Cylinders", presented at the AIAA/ASME 8th Structures, Structural Dynamics and Materials Conference, Palm Springs, California, March 29-31, 1967.

Block, D.L., "Influence of Discrete Ring Stiffeners and Prebuckling deformations on the Buckling of Eccentrically Stiffened Orthotropic Cylinders, NASA TN D-4283, January 1968

D. L. Block. Minimum weight design of axially compressed ring and stringer stiffened cylindrical shells. Technical Report CR-1766, NASA, 1971.