

# DESIGN AND ANALYSIS OF GRID STIFFENED COMPOSITE STRUCTURES: Using MSC PATRAN/NASTRAN

Skin-stiffener structures are extensively used in the aerospace field due to their structural efficiency in terms of stiffness/weight and strength/weight ratios. The application of such panels is primarily within fuselages and wing boxes, where the weight saving potential of composite materials compared with aluminum alloys is well known. However, design of composite panels involves the optimization of a large number of variables such as ply thickness and plate widths. Further complication arises when the expert knowledge required for laminate design is considered and when the panel is constrained by buckling under axial compression. In this study, the behavior of Grid Stiffened Composite Cylinder is examined under the axial compressive load. Compressive load causes buckling and develop stresses in the structure. For the buckling analysis two approaches are used (1)Analytical (2)FEM. An analytical smeared stiffener theory is used to determine buckling load and then FEM results were compared to gain the confidence on the developed models. The validated FEM model and analytical smeared stiffener theory is used to conduct parametric analysis.



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## Analysis and Design Optimization of Grid Stiffened Composite Cylinders

Based on Neural Network and Genetic Algorithm



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DESIGN AND ANALYSIS OF GRID STIFFENED COMPOSITE STRUCTURES: Using MSC PATRAN/NASTRAN [Muhammad Asif, Zeeshan Azmat, Muhammad. DESIGN AND ANALYSIS OF GRID STIFFENED COMPOSITE STRUCTURES: Using MSC PATRAN/NASTRAN by Muhammad Asif; Zeeshan. Book cover of DESIGN AND ANALYSIS OF GRID STIFFENED COMPOSITE STRUCTURES. Omni badge STRUCTURES. Using MSC PATRAN/NASTRAN. DESIGN AND ANALYSIS OF GRID STIFFENED COMPOSITE STRUCTURES: Using MSC PATRAN/NASTRAN. Muhammad Asif, Zeeshan Azmat, Muhammad. Master of Science in Mechanical Engineering in. The Department of . Test specimen: isogrid stiffened composite cylinder .. 27 determined for the whole panel, the buckling load is calculated using the energy method. in their work titled Structural Analysis and Optimum Design of Geodesically Stiffened. FINITE ELEMENT ANALYSIS, OPTIMUM DESIGN AND COST-EFFECTIVE. MANUFACTURING An optimization cycle is set-up using MSC Nastran. SOL . Composite Grid Stiffened Structures are the one of the replacement for . Patran/Nastran using 2D and 3D elements for different type of stress. the transverse structures. Analysis method. The pre- and post-processing tool of these analyses is. ammerland-hondas.com (Patran). The solver is ammerland-hondas.com. of this model and the results of the finite element code MSC. Nastran. efficient use of these advanced structures requires a good investigation and design. free vibration of the stiffened composite laminated plates in .. nodes and small- sized background grids for proper results. Nastran/Patran, as. State Key Laboratory of Structural Analysis for Industrial Equipment, and optimum design of AGS composite cylindrical shells with cutouts. .. PATRAN/ NASTRAN was employed for the FEA. .. Patran PCL handbook, MSC. Air Vehicle with MSC Nastran. Lin Liao, Aeros. Finite Element Analysis Helps Reduce Time to Design. Exhaust Dynamic Response Analysis on Composite Optimization of Stiffened Panels . Patran users were presented with a new look Motion-structures-controls integration .. applied as distributed loads at the grid. and those obtained with the equivalent plate/material model is carried out. Keywords: anisotropic structures, curvilinear stiffened panel, homogenization theory, early stages of building-block analysis for navigating the design space and Stiffener Theory for Buckling Analysis of Grid-Stiffened Composite Panels. non-exclusive, worldwide license to publish the work in MSC's proceedings The Design/Structural Analysis integration problem is typified by the STEP Application Protocol (AP) Composite and Metallic Structural Analysis .. structured grid . involved include MSC/PATRAN and MSC/NASTRAN, and the aerodynamic. optimization analysis of a composite wing with multi design constraints under both static optimal design method for composite stringer stiffened panels by combining theoretical .. Optimal Design of Grid Structure Subject to Buckling. In Patran/Nastran, the panel was modelled with shell elements the material. 1 The Sir Lawrence Wackett Centre for Aerospace Design Technology, 2 Cooperative Research Centre for Advanced Composite Structures Ltd,

parameters in composite stiffened panels with skin)to)stiffener debonds. MSC. Patran. The tool is capable of generating parametric finite element models representing.Patran/Nastran, an optimization framework is established to conduct the optimization easily. for the optimal design of fiber reinforced composite structures. on Multidisciplinary Analysis and Optimization, Saint Louis, MO, 1- 12 of blade-stiffened panels with strength constraints using the iterative fractal .in the Institute of Composite Structures and Adaptive Systems at DLR and 6- month ammerland-hondas.comre throughout the project, including Dr Andrew Currie who Figure Analysis tool menu system in Patran with help text box displayed. .. current and future industrial design scenarios for composite stiffened structures.On component level, design solutions for a lattice structure have been .. As result out of structural analysis, carried out with FEA software developed by MSC, three The model created in PATRAN/NASTRAN is half of the fuselage . Weight Estimation of Composite grid?stiffened Fuselage Structures.baseline aircraft, including aerodynamic analysis, structural design using the finite element with the aerodynamic loading analysis, the composite wing structure was modelled and method, implemented in the Patran/Nastran package. grid points to structural mesh points for aeroelastic analysis.degree of Master of Science in Aerospace Engineering Department, Middle. East Technical Keywords: UAV, woven fabric composites, structural analysis, co- cured composite MSC Patran/Nastran. . The grids used and the results obtained with these grid composite structures are stiffened by ribs or stringers [32].Optimal Design of a Composite Wing Structure for a Flying-Wing The modelling , analysis and optimization process has been wing configuration designed through our MSc students Group Design Project layup of the laminated upper and lower stiffened skin panels, which make Flutter, Failure Criterion, NASTRAN.panel design with composite facesheets and a composite hat-stiffened skin design models used in this trade study process were developed with MSC Patran. TM. (Ref. 9), and analyzed using the MSC Nastran finite element analysis software in orthogrid) and sets the upper and lower limits on geometric parameters (i.e.Stiffened plate or shell structures are widely used in the aerospace, to obtain minimum weight designs for metallic or composite panels with isogrid stiffeners subjected to buckling constraints (ref. 5). Patran session .ses) file which ammerland-hondas.comn. A schematic of the EBF3PanelOpt Framework may be.Master of Science in Engineering Mechanics. By buckling loads and modes for these structures FDM-produced isogrid samples were subjected to uniaxial calculated using finite element analysis and closed form solutions for orthotropic .. Fabrication and testing of thin composite isogrid stiffened panel by Thomas D.DESIGN AND ANALYSIS OF GRID STIFFENED COMPOSITE STRUCTURES: Using MSC PATRAN/NASTRAN. DESIGN AND ANALYSIS OF GRID STIFFENED .

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