

Structures

Papers Presented at the AIAA SciTech Forum and Exposition
2023

National Harbor, Maryland, USA and Online
23-27 January 2023

Volume 1 of 3

ISBN: 978-1-7138-7611-3

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 34922 Uwptkug'Xcmg{ 'F tkxg."Uwkug"422, Reston, VA 20191, USA.

TABLE OF CONTENTS

VOLUME 1

STRUCTURES AND MATERIALS IN EXTREME ENVIRONMENTS I (SPECIAL SESSION)

Hybrid Discontinuous Galerkin Process Zone Models for Thermal Induced Fractures and Fracture Reduced Heat Transfer	1
<i>Daniel N. Pickard, Christopher T. Quinn, Raul Radovitzky</i>	
A Discontinuous-Galerkin, Lagrangian Thermo-Chemo-Mechanical Material Response Solver for the Analysis of Ablative Thermal Protection Systems.....	18
<i>Christopher T. Quinn, Daniel N. Pickard, Raul Radovitzky</i>	
Novel Test and Analysis Methodology for the Assessment of Joint Under Re-Entry Environment.....	40
<i>Pavel Babuska, Waihong Tai, Vinay K. Goyal, Alvaro Rodriguez</i>	
Enhanced Manufacturing of Complex Shape Composites with Nano-Porous Networks.....	51
<i>Carina Xiaochen Li, Carlos Catalano, Carolina Furtado, Estelle Kalfon-Cohen, Shannon Cassady, Jeonyoon Lee, Seth Kessler, Brian L. Wardle</i>	

NASA 2040 VISION I (SPECIAL SESSION)

Machine-Learning-Assisted Characterization of Interfacial Failure in Solid-State Batteries.....	58
<i>Juner Zhu, Wei Li, Avtar Singh, Donal Finegan, Trevor Martin</i>	
Mixed-Domain Charge Transport in the S-Se System from First Principles.....	64
<i>Junsoo Park, Zhigang Wu, John Lawson</i>	
Modelling and Experiments to Guide the Manufacture of Fast-Charging and Long-Life Li-Ion Electrode Architectures	75
<i>Donal Finegan</i>	
Development of a Methodology for Analysis of Bonded Interface in Polymeric Matrix Composites in Presence of Manufacturing Defects.....	77
<i>Guillaume Seon, Andrew V. Makeev</i>	

STRUCTURAL JOINTS AND REPAIRS

A Complex Potential Methodology for Bolted Repair Analysis of Composite Laminates.....	80
<i>Steven G. Russell</i>	
Linear Viscoelastic Model of an Adhesively Bonded, Single Lap Shear Joint.....	102
<i>Cole T. Cappon, Craig G. Merrett</i>	

SPACECRAFT STRUCTURAL DESIGN, ANALYSIS, TEST AND MANUFACTURING

Sizing and Design Tool for Tall Lunar Tower	119
<i>Kyongchan Song, Martin Mikulas, Matthew K. Mahlin, Jacob T. Cassady</i>	

Towers: Critical Initial Infrastructure for the Moon	129
<i>William R. Doggett, Jacob Heppler, Matthew K. Mahlin, Richard S. Pappa, John Teter, Kyongchan Song, Brace White, Iok Wong, Martin Mikulas</i>	
Mechanical Properties of Hierarchical Beams for Large-Scale Space Structures	148
<i>Fakhreddin Emami, Andrew J. Gross</i>	
Theoretical and Experimental Analyses of Inflatable Structures.....	165
<i>Jitish Miglani, Wei Zhao, Rakesh K. Kapania, Shardul S. Panwar, Rikin Gupta, Azwan Aris</i>	
Design, Manufacturing, and Evaluation of Functionally Graded Adhesive Lap Joints Using Radiation Sensitive Adhesives.....	201
<i>Sam B. Hurvitz, Scott E. Stapleton</i>	

SPECIAL SESSION: DR. DEWEY HODGES MEMORIAL SESSION I

Flutter and Limit Cycle Oscillations of a Panel Using Unsteady Potential Flow Aerodynamics	218
<i>Luisa Piccolo Serafim, Maxim Freydin, Earl H. Dowell</i>	
Aeroelasticity of Very Flexible Aircraft: Prof. Dewey Hodges' Three-Decade Contributions to the Field.....	232
<i>Carlos E. Cesnik</i>	
Gust Alleviation of Highly Flexible Aircraft with Model Predictive Control	242
<i>Tianyi He, Weihua Su</i>	
Constitutive and Geometric Effects on Nonlinear Aeroelastic Trim and Stability of the Predator Aircraft	262
<i>Mojtaba Moshtaghzadeh, Natalia Rangel, Pezhman Mardanpour</i>	

COMPOSITE FAILURE ANALYSIS AND MODELING METHODS

Characterization of Meso-Scale Progressive Failure Model for Fiber Reinforced Composites from High Resolution Experimental Data.....	275
<i>Jose F. Rojas Sanchez, Anthony M. Waas</i>	
Derivation of Best Theory Diagrams Through the Use of Failure Indexes	281
<i>Marco Petrolo, Pierluigi Iannotti, Alfonso Pagani, Erasmo Carrera</i>	
A Multi-Mechanism Framework for Cure-Informed Probabilistic Progressive Failure Analysis of Composite Structures.....	289
<i>Minh Hoang Nguyen, Royan J. D'Mello, Anthony M. Waas</i>	

NASA 2040 VISION II (SPECIAL SESSION)

Molecular Dynamics Simulation of Effects of Solutes on Dislocation Propagation in Ni-Based Superalloys	297
<i>Mikhail I. Mendelev, Valery Borovikov, Nikolai Zarkevich, John Lawson, Timothy M. Smith</i>	
Towards Accurate and Efficient Predictions of Martensitic Transition Temperatures for Shape Memory Alloys from First Principles	302
<i>Zhigang Wu, Hessam Malmir, John Lawson</i>	

A Dislocation Mechanism-Based Constitutive Model for Hierarchical Anisotropic Materials: Ti6Al4V Implementation.....	308
<i>Chamara Herath, Janith C. Wanni, Steven M. Arnold, Ajit Achuthan</i>	

Effect of Damage Progression on the Thermal Conductivity of 3D Woven Composite Thermal Protection System Materials.....	318
<i>Brett A. Bednarcyk, Peter A. Gustafson, Trenton M. Ricks, Evan J. Pineda, Pappu L. Murthy, Subodh Mital</i>	

SPECIAL SESSION: DR. DEWEY HODGES MEMORIAL SESSION II

In Memory of Prof. Dewey Hodges: A Review of Advanced Beam Theories and Applications.....	347
<i>Zahra Sotoudeh, Mayuresh Patil</i>	

A Review of Modeling of Composite Structures.....	357
<i>Wenbin Yu</i>	

Deployment of Beam Theories in Determining Subsystem Properties for Statistical Energy Analysis.....	374
<i>Anurag Rajagopal</i>	

Prof. Hodges Memorial Session: A New Approach to Beam Cross-Sectional Analysis.....	383
<i>Mayuresh Patil</i>	

Properties and Layerwise Modeling of the Harlequin Variational Theorem for Composite Structures.....	397
<i>Luciano Demasi</i>	

ARTIFICIAL INTELLIGENCE/MACHINE LEARNING FOR MATERIALS AND STRUCTURES I

A Multigrid Finite Element Neural Network for Efficient Material Response Prediction	468
<i>Changyu Meng, Yongming Liu</i>	

CNN-Informed Genetic Algorithm for Optimizing Mechanical Performance of Carbon Nanotube Microscale Bundles	480
<i>Karen Demille, Joshua R. Leigh, Riley Hall, Ibrahim Guven, Ashley Spear</i>	

Multiphysics Modeling on the Capacity Degradation of Silicon Anode	493
<i>Parth Bansal, Zhuoyuan Zhang, Pingfeng Wang, Yumeng Li</i>	

Artificial Intelligence Assisted Residual Strength and Life Prediction of Fiber Reinforced Polymer Composites	504
<i>Partha Pratim Das, Muthu Elenchezhian, Vamsee Vadlamudi, Rassel Raihan</i>	

COMPOSITE FATIGUE, FRACTURE, AND DAMAGE METHODS

Lengthscales as a Viable Tool for Investigating Damage in Composites	516
<i>Jeffrey T. Chambers</i>	

4D X-Ray CT for Evaluation of Progressive Damage Growth of Composites Under Fatigue Loading.....	527
<i>Waruna P. Seneviratne, John Tomblin</i>	

Comparison of Uniaxial Spectrum Editing Method Performance	542
<i>Dominic Jarecki, Soonwook Kwon, Anahita Imanian, Nagaraja Iyyer</i>	
Fatigue Life Prediction Model Considering Surface Roughness for Additively Manufactured Metallic Components.....	559
<i>Kaushik Kethamukkala, Yongming Liu</i>	

COMPOSITE MANUFACTURING

Improved Method for Increased-Rate Stitched Composites Manufacturing	572
<i>Andrew E. Lovejoy</i>	
Mechanical Cloaking of Cutouts in Laminated Plates.....	583
<i>Calum J. McInnes, Alberto Pirrera, Byung Chul Kim, Rainer M. Groh</i>	
Stacking Sequence Optimization to Improve Volumetric Heat Generation for Induction Welding of Thermoplastic Composites	601
<i>Darun Barazanchy, Jaspreet Pandher, Michael J. Van Tooren</i>	
Manufacturing Trials of Integrally-Stiffened Panels for Flight Applications	613
<i>Alana Cardona, Dawn C. Jegley, Andrew E. Lovejoy</i>	

ARTIFICIAL INTELLIGENCE/MACHINE LEARNING FOR MATERIALS AND STRUCTURES II

A Mechanics-Informed Neural Network Framework for Data-Driven Nonlinear Viscoelasticity	625
<i>Faisal As'Ad, Charbel Farhat</i>	
Application of Machine Learning in Rapid Generation of Support-Free, Topologically-Optimised Structures.....	640
<i>Bohan Peng, Ajit Panesar</i>	
Implementation of Machine Learning-Based Lattice Generation Strategy for Elliptic-Cavity Lattice Cell	657
<i>Jier Wang, Ajit Panesar</i>	

BUCKLING AND STABILITY I

Integration of Fatigue R-Curve Effects into VCCT for Durability Predictions, Part 1: Buckled Composite Single-Stringer Stiffened Panels.....	670
<i>Austin Pennington, Vijay Goyal</i>	
Integration of Fatigue R-Curve Effects into VCCT for Durability Predictions, Part 2: Buckled Composite Multi-Stringer Stiffened Panels.....	688
<i>Austin Pennington, Vijay Goyal</i>	

VOLUME 2

Predicting Post-Buckling Response and Damage Initiation of Pristine Double Hat-Stiffened Laminated Composite Panels Utilizing Enhanced Schapery Theory	702
<i>Jacob N. Gagliano, Shiyao Lin, Vipul Ranatunga, Anthony M. Waas</i>	

Lessons Learned in the Buckling Assessments of Space Structures.....	717
<i>Vinay K. Goyal, James Tuck-Lee, Pavel Babuska, Emily Zeitunian, Luis Aguirre</i>	

COMPOSITE MECHANICS I

Simulation of Fiber Pullout Tests Using a Peridynamic Approach.....	731
<i>Riley Hall, Ibrahim Guven</i>	
Manufacture of Hybrid Standard-Ply/Thin-Ply Carbon/Epoxy Panels for Notched Test Specimens.....	739
<i>Andrew E. Lovejoy, Alana Cardona</i>	
Influence of Graphene Nanoplatelets on the Tensile Response of Stitched Composites with Thin Plies	749
<i>Radwa Alaziz, Shuvam Saha, Rani W. Sullivan</i>	

FATIGUE, FRACTURE, AND IMPACT DAMAGE

CNT Network Size/Interphase and Multimode Interlaminar Fracture of CNT Buckypaper Nanocomposites	761
<i>Masoud Yekani Fard, Hannah Seyler, Aditi Tata, Yesenia Orozco</i>	
Mechanical Energy Release Rate as Fracture Criterion of Cracked Piezoelectric Ceramic Using Extended Finite Element Method(XFEM)	770
<i>Suraj Singh, Goutam Chakraborty</i>	
Life Time Evaluation of an Annular-Type Combustion Chamber Based on Coupled Thermal-Fluid-Structure Simulation.....	781
<i>Hiroaki Amakawa, Miki Nishimoto, Shin-Ichi Moriya, Masao Takegoshi, Yu Daimon, Hideyo Negishi</i>	
Design Assessment of Metallic Thermal Protection System for Reentry Vehicles: Thermomechanical and Impact Properties	795
<i>Vinh Tung Le, Cheolheui Han, Nam S. Goo</i>	
Experimental Validation of the Fatigue Damage Squeezing Method for Biaxial Nonproportional Loading Conditions	820
<i>Tyler Van Fossen, Jacob Schichtel, Aditi Chattopadhyay, Nam D. Phan</i>	

NASA 2040 VISION III (SPECIAL SESSION)

Application Table: A Bridge Connecting the Designing “With-The-Material” and “The-Material” Paradigm’s.....	833
<i>Steven M. Arnold, Brandon L. Hearley, David Cebon</i>	
A Robust Schema for Machine Learning Data and Models Within the Granta MI Information Management System	851
<i>Brandon L. Hearley, Steven M. Arnold, Joshua Stuckner</i>	
Generation of 2-D Fiber Reinforced Composite Microstructures with Statistically Equivalent Features Using Machine Learning and Adaptive Data Generation.....	867
<i>Jamal Husseini, Farhad Pourkamali-Anaraki, Parisa Hajibabae, Scott E. Stapleton</i>	

Predicting Fiber Breakage Failure Mode of Plain Weave Fabrics with Multiscale Recursive Micromechanics	886
<i>Brandon L. Hearley, Evan J. Pineda, Brett A. Bednarczyk, Scott M. Murman, Mark Pankow</i>	
Computational Discovery of Complex Material Systems by Design Optimization	898
<i>Nicholas Boechler, Brianna McNider, Ryan Fancher, Jaeyub Hyun, Hyunsun A. Kim</i>	

FAIL-SAFE TECHNOLOGIES FOR BONDED UNITIZED COMPOSITE STRUCTURES (FASTBUCS) I

Fail-Safe Technologies for Bonded Unitized Composite Structures - Overview	904
<i>Stephen B. Clay, Philip Knoth, Savannah Crampton, Michael Gran, Brian Smyers, Wesley Ault</i>	
Demonstration Testing Approach on AFRL/NGC Fail-Safe Technologies for Bonded Unitized Composite Structures (FASTBUCS) Program	918
<i>Jonathan D. Bartley-Cho, Nav Muraliraj, Brian Smyers, Dustin Comer, Austin Land, Wesley Ault, James Finlay, Anthony M. Waas</i>	
Fail-Safe Prediction for Bonded Composite Structures Using Discrete Damage Modeling	928
<i>Vijay Goyal, Kevin H. Hoos, Wei-Tsen Lu, Endel V. Jarve</i>	
Weak Bond Study of Adhesively Bonded Composites for Laser Bond Inspection	943
<i>Abel Barraza, Jason Action</i>	
Design and Experimental Validation of a Bonded Structure Fail Safe Damage Arrest Concept in Mode II (shear Mode).	952
<i>Iddo Kressel, David Bardenstein, Alexander Lukatsky, Zvi Deutsch, Noam Shemesh, Stephen B. Clay, Brian Smyers, Philip Knoth, Wesley Ault</i>	

COMPOSITE STRUCTURES

Modal Test and Analysis Correlation of Wind Tunnel Blades for the National Transonic Facility	962
<i>Brian H. Mason, Carlos G. Davila, Andrew E. Lovejoy</i>	
Dynamic Performance of Hygro-Thermal-Mechanically Preloaded Variable Stiffness Composite Fairing Structures	978
<i>Giuseppe Sciascia, Vincenzo Oliveri, Paul Weaver</i>	
WrapToR Truss Stiffeners: Lightweight Reinforcement for Composite Skin Panels.....	1014
<i>Chris F. Grace, Mark Schenk, Benjamin K. Woods</i>	
Automated Immersion Type Ultrasonic C-Scan Inspection of Triangular Thermoset Composite Grid Structures for Aerospace Applications.....	1030
<i>Tayfun Durmaz, Robert Telford, Brendan Murray, Kelly Matthews, Ronan O'Higgins</i>	

STRUCTURES AND MATERIALS IN EXTREME ENVIRONMENTS II (SPECIAL SESSION)

Characterizing Air Plasma Sprayed Aluminum Oxide Coatings for the Protection of Lunar Structures.....	1039
<i>Perla C. Latorre, Quentin Fouliard, Seetha Raghavan</i>	

Design, Analysis and Experimental Development of Structural Joints for a Large Composite Cryotank	1045
<i>Aristidis Sidiropoulos, William P. Keith, Jeffrey D. Eichinger, Tin A. Luu, Juan C. Guzman, Jordan O. Birkland, Steven P. Wanthal</i>	
Modal and Structural Analysis of Lunar Domes Constructed Using Micro-Struts.....	1075
<i>Avi Gileadi, Cuauhtemoc Jimenez Avila, Maria Chierichetti</i>	
Correlation Study of SWOT Payload Acoustic Prediction and Test.....	1095
<i>Li Lin, Alexis Castel, Andrew Kissil, Gary Wang, Bryce Gardner</i>	
Design of Buoyant Architected Materials to Enable a New Aerial Platform Operating Near the Surface of Venus.....	1116
<i>Fakhreddin Emami, Andrew J. Gross</i>	

BUCKLING AND STABILITY II

Comparison of Various Skin-Stringer Connection Approaches for Stiffened Structures with Curvilinear Stiffeners	1124
<i>Wei Zhao, Junhyeon Seo, Rakesh K. Kapania</i>	
Ritz Method Using Orthogonal Jacobi Polynomials for Buckling Analysis of Curvilinearly Stiffened Functionally Graded Plate.....	1160
<i>Mayank Agarwal, Wei Zhao, Rakesh K. Kapania</i>	
Sensitivity Analysis of Geometric Imperfection Sources in Honeycomb Cores on Flatwise Compression Behavior	1189
<i>Adrian X. Rivera, Satchi Venkataraman, Hyonny Kim, Evan J. Pineda, Andrew Bergan</i>	
Testing of a Composite Conical-Cylindrical Shell	1204
<i>Michelle T. Rudd, Marc R. Schultz, Nathaniel W. Gardner, Cyrus J. Kosztowny, Chiara Bisagni</i>	

FAIL-SAFE TECHNOLOGIES FOR BONDED UNITIZED COMPOSITE STRUCTURES (FASTBUCS) II

Validation of a Cohesive Fatigue Law to Account for Fiber Bridging Effects in Stitched Resin Infused Structures.....	1222
<i>Brian Justusson, Bryan Lilley, Yuri Nikishkov, Gennadiy Nikishkov, Philip Knoth</i>	
Modelling Disbond in Stitched Resin Infused Structures Under Combined Loading	1240
<i>Brian Justusson, Bryan Lilley, Yuri Nikishkov, Philip Knoth</i>	
Progressive Failure Modeling of Z-Pin Reinforced Composite Pi Joints	1263
<i>James Finlay, Anthony M. Waas, Paul Davidson, Jonathan D. Bartley-Cho, Nav Muraliraj</i>	

COMPOSITE MATERIALS AND STRUCTURES

Optimization of CFRP Skeletal Structure of Morphing Wings and Manufacturing by Electrodeposition Resin Molding Method.....	1276
<i>Kazuaki Katagiri, Choong Sik Park, Sonomi Kawakita, Masato Tamayama, Shinya Honda, Katsuhiko Sasaki</i>	

Structural Health Monitoring of Composite Structures Using Guided Lamb Waves 1288
Emmanuel J. Nabiswa, Maria Chierichetti

Space Systems Technical Guide for Composite Overwrapped Pressure Vessels with a Plastic Liner 1303
Vinay K. Goyal, Christopher N. Sagrillo, Jacob Fannon, Jim Harris, Michael Kezirian, Scott Forth

Large Deflection Analysis of Thermally Prestressed Composite Beams Using Strong Unified Formulation 1313
Saheed O. Ojo, Giovanni Zucco, Paul Weaver

Investigation of SPH Modelling Technique for Nomex Honeycomb on Sandwich Structure Subjected to Low Velocity Impact 1329
Alican Sancaktar

ADDITIVE STRUCTURES I

Strain Rate Insensitivity of Additive Manufactured Lattices Under Quasi Static Compression Loading 1341
Anthony N. Palazotto, Derek Spear

Structurally Motivated Print Orientation Optimization for Fiber Reinforced Additive Manufacturing 1349
Noah Ray, Ilyong Kim

Influence of Nanofiller Agglomeration on Mechanical Properties of Nanocomposites: A Multiscale Study 1358
Abhiram B R, Debraj Ghosh

FRET (Flexible Reinforced Electronics with Textile): A Novel Technology Enabler for Deployable Origami-Inspired Lightweight Aerospace Structures 1365
Alessandro Buscicchio, Davide Vittori, Vittorio Netti, Nicola Mangialardi, Dino Guaragnella, Maria Cinefra

COMPOSITE MATERIALS AND STRUCTURES II

Closed Form 3D Analysis of Flat Laminates 1376
Gerald E. Mabson, Douglas L. Graesser, Michael A. Graesser

VOLUME 3

Design of Sandwich Structures for High Vibration and Noise Conditions 1405
Mehmet Ziya Polat, Ferhat Kadioglu

Effect of Micro-Porosity on Longitudinal Compressive Behavior of Uni-Directional Fiber Reinforced Plastics 1427
Shashidhar Krishnappa, Suhasini Gururaja

MATERIALS AND STRUCTURES FOR SURVIVABILITY

Radiation Hardening of Spacecraft and Other Autonomous Robotic Systems: Lunar Safety V2.0 1438
Ronald H. Freeman

Design and Evaluation of Additively-Manufactured MMOD Satellite Shielding	1445
<i>James Boudrie, Erin Shea, Henry Pyzdrowski, Kevin Brisker, Peter Fiori, Michael L. Anderson, Justin Rausch, Paul T. Mead, Kalyan R. Kota, Thomas E. Lacy</i>	
Comparison of Experimental, Numerical and Analytical Approaches to HRAM Events	1461
<i>Georg A. Heilig, Michael May</i>	
The Effect of Shot Dependency and Weave Matrix on Composite Materials Subject to Ballistic Testing	1472
<i>Jack T. Morgan, Alex M. Ramsperger, John H. Hansen</i>	

IMPACT DAMAGE AND RESIDUAL STRENGTH

Effects of Boundary Conditions on Damage Size in Composite Structures Subjected to Low Velocity Impact – an Analytical Study	1497
<i>Landon K. Henson, Matthew Molitor, Rebecca Cutting, Brian Carpenter, Brian Justusson, Vipul Ranatunga</i>	
Investigation of High-Velocity Nylon Bead Impact Damage on Aerospace Ceramic Materials	1509
<i>Joshua R. Leigh, Ibrahim Guven</i>	
Gas Permeability and Flexural Strength Post Impact of Cryogenically Cycled Composites	1518
<i>Shuvam Saha, Rani W. Sullivan</i>	
High Energy Dynamic Impact Testing of APC AS4D/PEKK-FC and TC1225 LMPAEK T700G Thermoplastic Composite Materials.....	1531
<i>Mike Pereira, Sandi G. Miller, Duane M. Revilock, Charles R. Ruggeri, Richard E. Martin</i>	
Knockdown in Load Bearing Capability of Thin and Thick Composites Due to Low Velocity Impact.....	1550
<i>Andrew Seamone, Paul Davidson, Anthony M. Waas</i>	

COMPOSITE MECHANICS II

Investigation of Damage Mechanisms in Composites Due to the Interaction of Ply and Fiber Waviness Defects.....	1562
<i>Jarod Heise, Paulina Diaz Montiel, Satchi Venkataraman</i>	
Local Analysis-Test Correlation of Tow-Steered Composite Shells with Small Cutouts	1587
<i>K Chauncey Wu, Rainer M. Groh, Nathaniel W. Gardner</i>	
Modeling and Characterization of Crushable Composite Structures.....	1615
<i>Deepak Kumar Patel, Evan J. Pineda, Paria Naghipour, Steven M. Arnold</i>	

NASA 2040 VISION IV (SPECIAL SESSION)

A Data-Driven Bayesian Model for Fatigue in Ni-based Superalloy Microstructures	1627
<i>Somnath Ghosh, George Weber, Maxwell Pinz</i>	
Multifidelity Robust Topology Optimization for Material Uncertainties with Digital Manufacturing	1646
<i>Jaeyub Hyun, Anirban Chaudhuri, Karen E. Willcox, Hyunsun A. Kim</i>	

ADDITIVE STRUCTURES II

Structural-Mechanical Characterisation of Triply Periodic Minimal Surface Sheet Networks: Simulation and Experiment	1659
<i>Hendrik Traub, Moritz Sprengholz, Daniel Teufel, Christian Hühne</i>	
Effects of Tape Staggering Pattern on Interlaminar Strength and Surface Quality of In-situ Consolidated Automated Fiber Placement Thermoplastic Composites	1687
<i>Timothy Yap, Ali Yeilaghi Tamijani, Mehran Tehrani</i>	
Structural Requirements, Process Simulation, and Residual Stress Characterization for Additively Manufactured Spaceflight Parts.....	1698
<i>Brett Soltz, Vinay K. Goyal, Jacob Rome, David Witkin, Xueyong Qu</i>	
Development of an Additive Manufactured Fitting Sensorized with Optical Fibres for Load Recognition	1708
<i>Alessandro Airoldi, Pietro Ballarin, Sebastiano Di Mauro, Daniela Rigamonti, Felix Reinert, Mohammad M. Dadras, Saba Zabihzadeh, Eustachio De Nicolò, Paolo Bettini, Lorenzo Cartabia</i>	
Additive Manufacturing Material Behavior Prediction - A Simulation Based ICME Approach.....	1724
<i>Yi Zhang, Junyan He</i>	

AIRCRAFT STRUCTURAL DESIGN, ANALYSIS, TEST AND MANUFACTURING

A DoE-Based Scalable Approach for the Preliminary Structural Design of Box-Wing Aircraft from Regional to Medium Range Categories.....	1733
<i>Vincenzo Binante, Karim Abu Salem, Giuseppe Palaia, Davide Zanetti, Vittorio Cipolla</i>	
Structural Sizing of a Composite Transonic Truss-Braced Wing	1751
<i>Erin K. Anderson, Alana Cardona, Brian H. Mason</i>	
Modeling and Simulation of a Compression Molding Process for Aircraft Structures with Recycled Thermoplastic Composites	1766
<i>Sooyoung Lee, Minsu Park, Wooseok Ji</i>	

BUCKLING AND STABILITY III

Design of Isotropic Morphing Multi-Stable Corrugated Shell Structures on Elastic Walls.....	1776
<i>Giovanni Zucco, Paul M. Weaver</i>	
Asymptotic Non-Linear Analysis of Fung Anisotropic Hyperelastic Plate	1790
<i>Shravan K. Bhadoria, Ramesh G. Burela</i>	
Numerical Investigation on the Buckling Behavior of Sub-Stiffened Panels and Its Optimization Study.....	1805
<i>Md Nazmul Hossain Irfan, Tianhong Wang, Abu Bakar</i>	

OTHER TOPICS IN STRUCTURES I

Attenuation Characteristics of In-Plane Wave Propagation in Two-Dimensional Polycrystalline Microstructure	1825
<i>Manas K. Padhan, Mira Mitra</i>	

Interphase of Single and Double CNT Networks with Surrounding Polymer in Atomic Force Microscopy.....	1832
<i>Masoud Yekani Fard</i>	
Prediction of Elasto-Plastic Behaviour of Short Fiber Reinforced Polymer Composites Using Artificial Neural Network.....	1840
<i>Subrat K. Maharana, Ganesh Soni, Mira Mitra</i>	
Interference Fit Contact Finite Element Modelling and Optimization for Modal Analysis and Friction Instability	1848
<i>Ahmed M. Nagib Elmekawy, Tarek Badr, Hassan Elgamal</i>	
Solid Propellant Macro-Scale Behavior in Presence of Micro-Scale Failure Mechanisms Under Tension and Cyclic Loads.....	1868
<i>Julia Belitsky, Emanuel Ore, Tanchum Weller</i>	

BUCKLING AND STABILITY IV

Buckling of Metamaterial-Based Cylindrical Shells Under Axial Compression.....	1886
<i>Mitansh S. Doshi, Xin Ning</i>	
Buckling Tolerance Design of Aircraft Fuselage Using Carbon Fiber Reinforced Thermoplastic (CFRTP)	1910
<i>Haruka Kaneda</i>	
Weight-Effect of Buckled Composite Stiffened Panels Under Static Compression	1921
<i>Vijay Goyal, Jacob N. Gagliano, Austin Pennington, Shiya Lin, Anthony M. Waas</i>	

OPPERA: ORGANIC MATRIX COMPOSITES PROCESS-TO-PERFORMANCE EVALUATION, RESEARCH, AND ANALYSIS (SPECIAL SESSION)

Development and Calibration of a Model for Predicting the Structural Response of Bonded Composite Pi-Joints.....	1942
<i>Matthew Kirby, Marcus Stanfield, Erin C. Decarlo, David Riha</i>	
Progressive Damage Analysis of Complex 3D Textiles with Open Holes Using Independent Mesh Method and Discrete Damage Modeling.....	1960
<i>Kevin H. Hoos, Hari K. Adluru, Endel V. Iarve, Eric Zhou, M. K. Ballard, David Mollenhauer</i>	
Organic Matrix Composites Process-To-Performance, Evaluation, Research and Analysis (OPPERA).....	1969
<i>David S. Riha, Matthew Kirby, Marcus Stanfield, Vikram Bhamidipati, Eric Zhou, Alireza Forghani, Endel V. Iarve, Kevin H. Hoos, Hari K. Adluru, Michael K. Ballard, Alex S. Selvarathinam, David Mollenhauer</i>	
Uncertainty Quantification of Fiber Volume Fraction of Fiber Bundles Using Digital Chains	1985
<i>Vikram Bhamidipati, David Riha, Eric Zhou, Michael K. Ballard, David Mollenhauer</i>	

BEAM METHODS

Discrete Nonlinear Lattice Truss Beam Displacement Analysis Related to Fundamental Solid Mechanics, Heat Transfer, and Fluid Mechanics Theory	1994
<i>Winfred S. Kenner</i>	

Ritz Analysis of Stepped Beams Subjected to Discontinuous Load 2013
Sudharsan Parthasarathy, Rakesh K. Kapania

OTHER TOPICS IN STRUCTURES II

An Aerospace Structural Sizing Tool with Sectional Equivalent Beam Requirements 2034

Mario Lee, Stephen Jones, August Noevere, Bertram Stier

An Integrated Design Tool for Tow-Steering Composites in Abaqus and MSC.Patran/Nastran 2054

Xin Liu, Bangde Liu, Twinkle Kothari, Su Tian, Yufei Long, Frank Leone, Wenbin Yu

Effects of Liquid Disinfectants and Ultraviolet-C Germicidal Irradiation on Honeycomb Core

Sandwich Panels 2065

Akhil Bhasin, Aswini Kona Ravi, Luis D. Castillo, Tanat Maichan, Luis M. Gomez, Gerardo Olivares

Reflections on 37 Years as a NASA Structural Engineer 2076

John J. Zipay

Author Index