



**American Society for Composites 31<sup>st</sup> Technical Conference and  
ASTM Committee D30 Meeting**

*September 19-22, 2016*

*Williamsburg Lodge*

*Williamsburg, Virginia*



*Conference Chairs:*

*Barry Davidson*

*James Ratcliffe*

*Michael Czabaj*

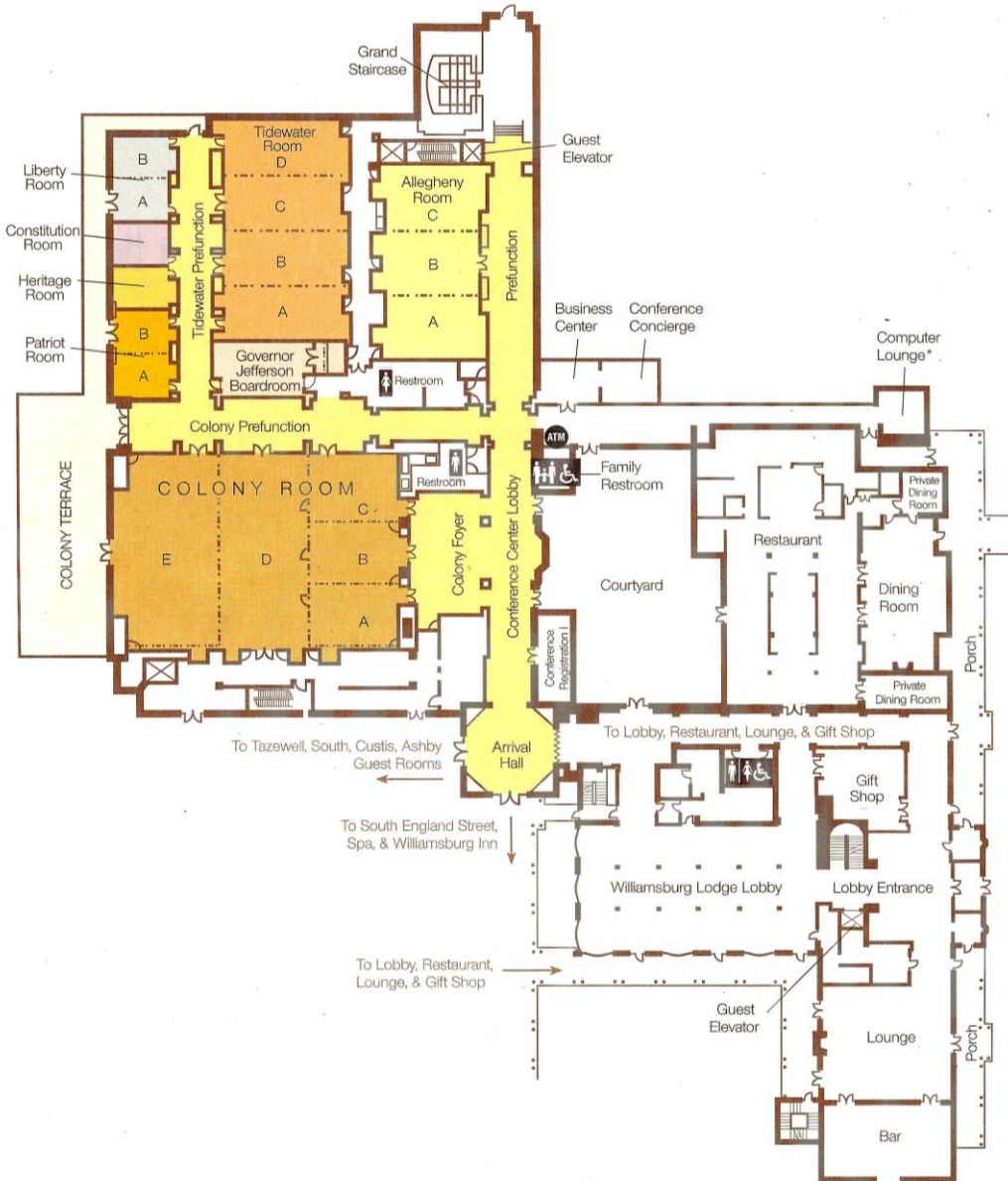
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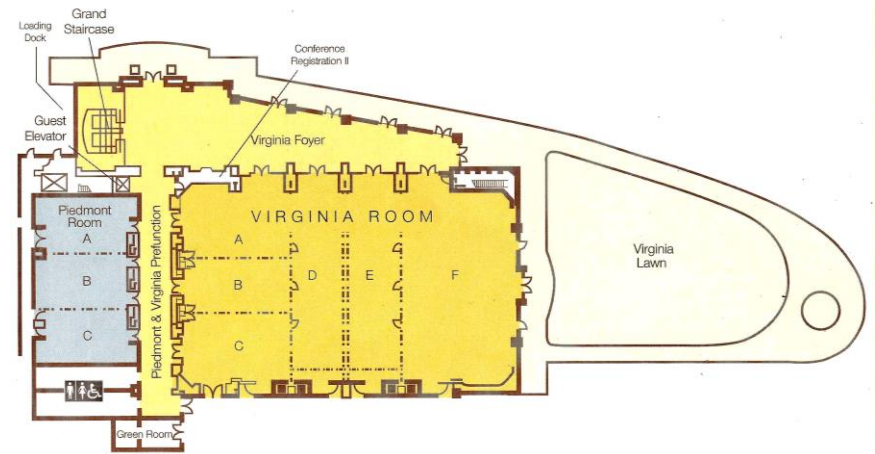
<http://mech.utah.edu/ASC2016/>

# Williamsburg Lodge Floor Plan

## Main Level



## Lower Level



# Conference Information

**Meals and Refreshments:** A complete continental breakfast with coffee, juice, fruit, pastries, muffins, croissants, cereal and yogurt will be provided in the morning, before the plenary session. Coffee will also be available after the plenary session, as well as during the morning break from 10:30 – 10:45 AM. On Monday and Tuesday, box lunches will be provided consisting of a choice of sandwich, chips, cookie, fruit and bottled water or soft drink. Iced tea, lemonade and water will be provided during the afternoon break on Monday and Tuesday from 3:00 – 3:20 PM.

**Extra Reception and Banquet Tickets:** Please visit the registration desk to purchase extra tickets for the reception (hors d'oeuvres and one drink ticket - \$30) and banquet (dinner and dinner speaker Astronaut Dr. Nancy Currie-Gregg - \$90).

**Internet:** For WiFi Internet Access, connect to the “makehistory@cw” network and then open your browser – the Colonial Williamsburg homepage will appear.

***If you are staying at the Williamsburg Lodge:*** Click on the button in the middle of the page that says room number. Then follow the prompts to enter your last name and room number. You should now be connected to the internet.

***If you are not staying at the Williamsburg Lodge:*** Click on the button in the middle of the page that says Guest. Then follow the prompts to enter your email address. You should now be connected to the internet.

**On-line Paper Access:** Conference papers will be available on-line during the conference only and can be accessed through the link on the conference website, <http://mech.utah.edu/ASC2016/>.

**Session Chair Info:** Session chairs should strictly enforce and follow the published conference schedule. If a presenter does not show up, the chair will call a recess until the next scheduled presentation. The ordering of presentations cannot be shuffled. Please keep the introductions brief. *For each session, please fill out a best paper nomination form and, once completed, return these to the registration desk.*

**Presenter Info:** Presentation slots are 25 minutes. However, please prepare a presentation lasting no longer than 20 minutes to allow for questions and answers and changing speakers. Also, before your session starts, please introduce yourself to the session chair and provide any basic information that is requested by the chair.

**Audio/Visual Equipment:** Each room has an LCD projector, VGA video cable, projection screen, and PC-based computer. Speakers may use their own computers (suggested for video content) or they may use the one that is provided. A room microphone is available in Colony DE only. None of the rooms have PC-based audio feeds.

***If you use the PC that is provided:*** Please copy your presentation file to the room’s computer during one of the breaks before your presentation starts and test it.

***If you use your own PC:*** Have your PC powered up and your presentation loaded before your presentation starts and be ready to change over to your computer for a quick speaker transition.

**No Smoking Policy:** Smoking is not permitted anywhere inside the Williamsburg Lodge.

## **A special thank you to the topic organizers and advisors who helped make this conference a success:**

Abhendra Singh, Air Force Institute of Technology  
Adnan Ashfaq, University of Texas at Arlington  
Andrew Makeev, University of Texas at Arlington  
Bhawesh Kumar, Dow Chemical  
Brad Lucht, Honeywell  
Caihua Cao, Boeing Commercial Airplanes  
Cara Leckey, NASA LaRC  
Charles Bakis, The Pennsylvania State University  
Chiara Bisagni, Delft University of Technology  
Craig Olhorst, NASA Langley Research Center  
Daniel Adams, University of Utah  
Danielle Zeng, Ford Motor Co.  
David Mollenhauer, Air Force Research Laboratory  
Dayakar Penumadu, University of Tennessee  
Dianyun Zhang, University of Connecticut  
Dy Le, U.S. Army Research Laboratory  
Evan Pineda, NASA Glenn Research Center  
Gaurav Nilakantan, Teledyne Scientific Company  
Greg Odegard, Michigan Tech  
Gretchen Murri, NASA Langley Research Center  
Hamid Dalir, Syracuse University  
Hyonny Kim, University of California, San Diego  
Jandro Abot, The Catholic University of America  
Johnathan Goodsell, Purdue University  
Kishore Pochiraju, Stevens Institute of Technology

Kristopher Wise, NASA Langley Research Center  
K.T. Tan, University of Akron  
Liangkai Ma, Dow Chemical  
Lyle Deobald, Boeing Commercial Airplanes  
Mark Hilburger, NASA Langley Research Center  
Mark Pankow, NC State University  
Mia Siochi, NASA Langley Research Center  
Mihaela Banu, University of Michigan  
Nelson De Carvalho, NASA Langley Research Center  
Norman Knight, NASA Langley Research Center  
Pavana Prabhakar, The University of Texas at El Paso  
Rani Sullivan, Mississippi State University  
Ray Fertig, University of Wyoming  
Rick Young, NASA Langley Research Center  
Riyad Aboutaha, Syracuse University  
Robert Haynes, US Army Research Laboratory  
Robin Ford, National Institute of Aerospace  
Ronald Krueger, National Institute of Aerospace  
Sam Huang, Stony Brook University  
Sanjib Chowdhury, University of Delaware  
Satchi Venkataraman, San Diego State University  
T. Kevin O'Brien, NASA Langley Research Center  
Thomas Lacy, Mississippi State University  
Venkat Aitharaju, General Motors  
Wenbin Yu, Purdue University

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# Plenary Presentations



September 19, Monday, 8-9 am

## ***Stochastic Virtual Tests for Multiple Scales***

**Dr. Brian Cox, Arachne Consulting**

*A substantial fraction of the scatter observed in strength and fatigue life originates in the stochastic nature of a material's microstructure. We will review how stochastic composite microstructure can be characterized statistically and how stochastic virtual specimens can be built by reconstruction algorithms that reproduce the measured statistics. We will also highlight successes and shortcomings in modern strategies for predicting stochastic damage evolution in statistically significant ensembles of stochastic virtual specimens.*



September 20, Tuesday, 8-9 am

## ***Composites in the Mainstream***

**Dr. Tia Benson Tolle, Director, Advanced Materials, Boeing Commercial Aircraft**

*Composite materials technology has become mainstream in many industries, from aerospace to automotive, and has worked its way into everyday life. As a class of materials they are by nature designed with a particular application in mind, but there are general challenges and opportunities around which all can rally. This talk will discuss today's opportunity space for accelerating the industrialization of this technology.*



September 21, Wednesday, 8-9 am

## **ASTM Stinchcomb Award Presentation**

### ***Carbon/Thermoplastic Composites for Automotive Applications***

**Dr. Jack Gillespie, University of Delaware Center for Composite Materials**

*An all-thermoplastic carbon fiber composite B-Pillar for automotive applications is designed, manufactured and impact tested to meet side-impact crash safety requirements while providing 60% weight savings over the metal baseline.*

# Program Overview

	<b>Monday 9/19</b>	<b>Tuesday 9/20</b>	<b>Wednesday 9/21</b>	<b>Thur. 9/22</b>
	<b>Breakfast and Registration. 7:00 to 8:00 am</b>	<b>Breakfast and Registration. 7:00 to 8:00 am</b>	<b>Breakfast and Registration. 7:00 to 8:00 am</b>	
<b>Rm ID</b>	<b>Opening Remarks &amp; Plenary Session, Dr. Brian Cox, Arachne Consulting, <i>Stochastic Virtual Tests for Multiple Scales.</i> 8:00 to 9:00 am, Colony DE</b>	<b>Plenary Session, Dr. Tia Benson Tolle, Boeing Commercial Aircraft, <i>Composites in the Mainstream.</i> 8:00 to 9:00 am, Colony DE</b>	<b>ASTM Stinchcomb Award Presentation, Dr. Jack Gillespie, <i>Carbon/Thermoplastic Composites for Automotive Applications.</i> 8:00 to 9:00 am, Colony DE</b>	<b>ASTM D30 Meetings 8:00 am to 5:45 pm.  Location: Piedmont BC</b>
	<b>Coffee Break. 9:00 to 9:15 am</b>	<b>Coffee Break. 9:00 to 9:15 am</b>	<b>Coffee Break. 9:00 to 9:15 am</b>	
<b>Aa</b>	<b>Session M1: 3 papers. 9:15 to 10:30 am</b> Additive Manufacturing	<b>Session T1: 3 papers. 9:15 to 10:30 am</b> Static and Fatigue Damage Correlation	<b>Session W1: 3 papers. 9:15 to 10:30 am</b> Sandwich Performance Improvements	
<b>Ab</b>	Armor and Protection 1	Interlaminar Properties 1	Automotive Composites 3	
<b>Ac</b>	Impact Dynamic Response	Impact of Fabric Composites	Dynamic Response Modeling	
<b>Ta</b>	Manufacturing and Processing 1	Manufacturing and Processing 4	Manufacturing and Processing 6	
<b>Tb</b>	Micromechanics 1	Micromechanical Effects 1	Materials for Durability & Damage Tol 1	
<b>Tc</b>	Nanocomposites with Traditional Materials	Nanocomposites Characterization	Progressive Damage 4	
<b>Td</b>	Multiscale Modeling 1	NDE and SHM 1	NDE and SHM 4	
<b>Pbc</b>	Testing and Characterization 1	Testing and Characterization 3	ASTM D30.09 Meeting	
<b>Cde</b>	Multifunctional and Smart Composites 1	Multifunctional and Smart Composites 5		
	<b>Coffee Break. 10:30 to 10:45 am</b>	<b>Coffee Break. 10:30 to 10:45 am</b>	<b>Coffee Break. 10:30 to 10:45 am</b>	
<b>Aa</b>	<b>Session M2: 3 papers. 10:45 am to noon</b> Delamination Growth Modeling	<b>Session T2: 3 papers. 10:45 am to noon</b> Sandwich Property Characterization	<b>Session W2: 3 papers. 10:45 am to noon</b> Sandwich Experiments and Modeling	
<b>Ab</b>	Armor and Protection 2	Interlaminar Properties 2		
<b>Ac</b>	High Velocity Impact Damage	Impact Damage Residual Strength	Effects of Defects 2	
<b>Ta</b>	Manufacturing and Processing 2	Manufacturing and Processing 5	Manufacturing and Processing 7	
<b>Tb</b>	Micromechanics 2	Micromechanical Effects 2	Materials for Durability & Damage Tol 2	
<b>Tc</b>	Nanocomposite Modeling	Applications to Graphene	Institute for Adv Comp Manuf Innovation	
<b>Td</b>	Multiscale Modeling 2	NDE and SHM 2	NDE and SHM 5	
<b>Pbc</b>	Testing and Characterization 2	Testing and Characterization 4	ASTM D30.04 Meeting	
<b>Cde</b>	Multifunctional and Smart Composites 2	Multifunctional and Smart Composites 6		
	<b>Lunch. 12:00 to 1:20 pm</b>	<b>Lunch. 12:00 to 1:20 pm</b>	<b>Lunch (on your own)</b>	

## Program Overview (Continued)

	Monday 9/19	Tuesday 9/20	Wednesday 9/21	Thur. 9/22
	<b>Session M3: 4 papers. 1:20 to 3:00 pm</b>	<b>Session T3: 4 papers. 1:20 to 3:00 pm</b>	<b>NASA Langley Research Center Tour</b> <i>For those that are preregistered only</i>	
<b>Aa</b>	NAFEMS: Analysis Benchmarking	Symposium in Memory of Jeffery Schaff	Check-in at the Conference Registration Desk 7:30 am – noon on Wed 9/21 to obtain your tour wrist band  Assemble in front of Williamsburg Lodge at 12:30 pm  Buses depart at 12:45 pm. <i>You must have a tour wrist band to board the bus.</i>  Buses will return at approximately 6:15 pm.	
<b>Ab</b>	Bonded Joints	Automotive Composites 1		
<b>Ac</b>	Sandwich Indentation and Impact	Effects of Defects 1		
<b>Ta</b>	Model Validation, Verif & Uncertainty Quant	Marine Composites		
<b>Tb</b>	Fatigue and Fracture	Civil Structural Elements and Systems		
<b>Tc</b>	Progressive Damage 1	Progressive Damage 2		
<b>Td</b>	Multiscale Modeling 3	NDE and SHM 3		
<b>Pbc</b>	Space Applications	Testing and Characterization 5		
<b>Cde</b>	Multifunctional and Smart Composites 3	Multifunctional and Smart Composites 7		
	<b>Refreshment Break. 3:00 to 3:20 pm</b>	<b>Refreshment Break. 3:00 to 3:20 pm</b>		
	<b>Session M4: 4 papers. 3:20 to 5:00 pm</b>	<b>Session T4: 4 papers. 3:20 to 5:00 pm</b>		
<b>Aa</b>	Advances in Modeling 1	Advances in Modeling 2		
<b>Ab</b>	Armor and Protection 3	Automotive Composites 2		
<b>Ac</b>	Textile and 3D Composites	Natural, Bio, Green and Novel Composites		
<b>Ta</b>	Manufacturing and Processing 3	Molecular Modeling		
<b>Tb</b>	Fatigue Testing and Modeling	Civil Transportation Infrastructure		
<b>Tc</b>	Nanocomposites Manuf & Processing	Progressive Damage 3		
<b>Td</b>	Multiscale Modeling 4	Composites Education		
<b>Pbc</b>	Panel Discussion: Composites in Space	Panel Discussion: Certification Efficiency		
<b>Cde</b>	Multifunctional and Smart Composites 4	Stability and Postbuckling		
	<b>ASC General Membership Meeting.</b> <b>5:15 to 5:45 pm, Colony DE</b>	<b>ASC Technical Division Meetings.</b> <b>5:15 to 5:45 pm, Tidewater ABCD</b>		
	<b>Welcome Reception – Colony Foyer and Courtyard. 6:00 to 7:00 pm (bar opens at 5:30 pm)</b>	<b>Social Hour and ASC Awards Banquet.</b> <b>Colony Foyer and Colony Room. 6:00 to 9:30 pm (bar opens at 5:30 pm)</b>		

\*\*\* Presentation slots are 25 minutes. Prepare at most a 20 minute presentation to allow time for Q&A and changing speakers \*\*\*



# Detailed Schedule

**MONDAY 9/19 MORNING**

**Continental Breakfast 7:00 to 8:00 am – Colony ABC**

**Monday 9/19 Plenary Session, 8:00 to 9:00 am, Colony DE**

**Welcoming remarks by Barry Davidson and speaker introduction by Michael Czabaj**

**Dr. Brian Cox, Arachne Consulting**

**Presentation Title: Stochastic Virtual Tests for Multiple Scales**

**Coffee Break 9:00 to 9:15 am – Colony ABC**

**Monday Session M1 9/19, 9:15 to 10:30 am**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>M1</b>	<b>Additive Manufacturing</b> Chair: Mia Siochi	<b>Armor &amp; Protection 1</b> Chair: Gaurav Nilakantan	<b>Impact Dynamic Response</b> Chair: K.T. Tan	<b>Manufacturing and Processing 1</b> Chair: Carl Rousseau	<b>Micromechanics 1</b> Chair: Sam Huang	<b>Nanocomposites with Traditional Materials</b> Chair: Jin Ho Kang	<b>Multiscale Modeling 1</b> Chair: Steven Arnold	<b>Testing and Characterization 1</b> Chair: Charles Bakis	<b>Multifunctional and Smart Composites 1</b> Chair: Jandro Abot
9:15	203: <b>Fused deposition modeling of fiber-reinforced thermoplastic polymers: past progress and future needs</b> , B. Brenken, A. Favaloro, E. Barocio, N.M. DeNardo, V. Kunc, R.B. Pipes	SESSION KEYNOTE: <b>Protecting soldiers - current development efforts and future trends</b> , James Zheng, US Army	1519: <b>Low velocity impact damage and response of stringer stiffened composite panel</b> , D. Whisler, H. Kim	3602: <b>Development of a new finite element simulation strategy for prediction of thermal and resin shrinkage deformations of composite parts during cure</b> , X. Cao, H. Tian, H. Dalir	2102: <b>Homogenization of linearly elastic materials with pores of irregular shapes via direct FEA and single pore approaches</b> , I. Tsukrov, B. Drach, A. Trofimov, K. Vasylevskiy	2720: <b>Polymer nanocomposite in flexible electronics packaging</b> , C. Chen, S. Ganguli, A. Schrand, A.K. Roy	4002: <b>Local mean fiber orientation via computer assisted tomography analysis for long discontinuous fiber composites</b> , B.R. Denos, R.B. Pipes	3902: <b>A biaxial-bending test to observe the growth of interacting delaminations in a composite laminate plate</b> , M. McElroy, W. Jackson, M. Pankow	2412: <b>Highly stretchable strain sensor based on polyurethane-modified carbon nanotube buckypaper</b> , B. Ashrafi, K. Laquam, Y. Martinez-Rubi, M. Jakubinek, B. Simard, D. Park, K. O'Neill
9:40	205: <b>Nano-scaled structures through charged particle interactions</b> , M.H. Merrill, K. Teferra, W. Kang	307: <b>Techniques for relating stresses and strains in fabrics and fiber-reinforced composites between various hierarchical scales</b> , A.J. Carpenter, S. Chocron, C.E. Anderson Jr.	1514: <b>Auxetic and hybrid honeycomb structures for energy absorption applications: design and in-plane dynamic crushing behaviors</b> , A. Ingrole, A. Hao, R. Liang	1819: <b>3D permeability of thick-section off-axis glass fabric vinyl ester composite by VARIM processing</b> , E. Pedneau, S.S. Wang	2103: <b>Modeling aperiodic dimensionally reducible structures using mechanics of structure genome</b> , B. Peng, W. Yu	2714: <b>Carbon nanotubes influence on natural/synthetic hybrid composites mechanical properties</b> , N.C. Menezes, F.C. Lima, C.F. Silva, S.G. Leão, G. Arantes, M.G. Martins, A.F. Ávila	3102: <b>Assessing progressive failure of large-scale composite structures using a damage-based multi-scale model</b> , J. Montesano, C.V. Singh	3704: <b>Distributed optical sensing in composite laminate end-notched flexure tests</b> , L. Meadows, R. Sullivan, V. Ranatunga, K. Vehorn, K. Brown, S. Olson	2404: <b>Design of carbon nanotube sheet embedded fiber composites with in situ structural health monitoring capability</b> , H. Liu, K. Liu, G. Chen, D. Heider, E. Thostenson

10:05	202: <b>Micromechanical analysis and characterization of fused deposition modeling parts,</b> <i>G.P. Tandon, E. Zhou, R. Gerzeski, H. Koerner, T.J. Whitney</i>	306: <b>Ballistic strength of Kevlar KM2 fabric resisting FSP projectiles,</b> <i>Y. Ma, Y. Wang, M. Dippolito, C-F. Yen, J.Q. Zheng, V. Halls</i>	1506: <b>Numerical investigation of the damage in composite materials under dynamic loads using a combination of intralaminar and interlaminar model,</b> <i>M. Ait-Mohammed, M. Tarfaoui, O. Hassoon</i>	1825: <b>Composite cure process modeling and simulations using COMPRO® and validation of residual strains using fiber optics sensors,</b> <i>T. Sreekanthamurthy, T.B. Hudson, T-H. Hou, B.W. Grimsley</i>	2106: <b>A micromechanics based processing model for the curing response of a unidirectional fiber reinforced composite,</b> <i>W. Chen, D. Zhang</i>	2706: <b>Carbon nanotubes to improve short glass fiber composites,</b> <i>E.O. Taha, E.C. Borowski, U.F. Kandil, A.E-S. Awadallah, A.A. Aboul-Enein, M.R. Taha</i>	2508: <b>Multiscale modeling for prediction of initial matrix crack in laminated composites,</b> <i>Y. Kumagai, T. Okabe, K. Yoshioka</i>	3702: <b>Development of a novel in-plane tension-tension biaxial cruciform specimen,</b> <i>J. French, D. Rapping, D. Mollenhauer, M. Czabaj</i>	2413: <b>A biocompatible pressure sensor based on styrene-isobutylene-styrene (SIBS) and carbon black,</b> <i>B. Morales, M. Fittipaldi, A. Damley-Strnad, L.R. Grace</i>
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**Coffee Break 10:30 to 10:45 am – Colony Foyer**

**Monday Session M2 9/19, 10:45 am to noon**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>M2</b>	<b>Delamination Growth Modeling</b> Chair: Carlos Davila	<b>Armor &amp; Protection 2</b> Chair: Leigh Phoenix	<b>High Velocity Impact Damage</b> Chair: Hyonny Kim	<b>Manufacturing and Processing 2</b> Chair: James Reeder	<b>Micromechanics 2</b> Chair: Dianyuan Zhang	<b>Nanocomposite Modeling</b> Chair: Endel larve	<b>Multiscale Modeling 2</b> Chair: Wenbin Yu	<b>Testing and Characterization 2</b> Chair: Bhawesh Kumar	<b>Multifunctional and Smart Composites 2</b> Chair: Guangfeng Hou
10:45	1102: <b>Modeling fatigue damage onset and progression in composites using an element-based virtual crack closure technique combined with the floating node method,</b> <i>N.V. De Carvalho, R. Krueger</i>	309: <b>Parametric homogenization based continuum damage mechanics model for composites,</b> <i>X. Zhang, Z. Li, S. Ghosh, D. O'Brien</i>	1518: <b>Investigation of high velocity impact responses of a glass/epoxy composite with a gas gun,</b> <i>A. VanderKlok, A. Stamm, M. Auvenshine, R. Hu, J. Dorer, X. Xiao</i>	1812: <b>Temperature dependent flexural rigidities and thickness investigation,</b> <i>K.D. White, L.M. Dangora, J.A. Sherwood</i>	2111: <b>Influence of fiber distribution on the responses of fiber tows for textile composites,</b> <i>H.S. Huang</i>	2710: <b>Simulation of the electromechanical properties of carbon nanotube polymer nanocomposites for strain sensing,</b> <i>M.A.S. Matos, V.L. Tagarielli, S.T. Pinho</i>	2502: <b>Damage analysis of various CNT architectures in nanocomposites using a multiscale approach,</b> <i>A. Rai, A. Chattopadhyay, C. Lopez</i>	3701: <b>Microscale investigation of the compressive behavior in unidirectional PMCs through in-situ SEM and X-ray CT Experiments,</b> <i>T. Quick, D. Mollenhauer, B. Wheeler, A. Kadhim, N. Sesar</i>	2406: <b>Development of an experimental setup to analyze carbon/epoxy composite subjected to current impulses,</b> <i>P. Gharghabi, J. Lee, M.S. Mazzola, T.E. Lacy</i>
11:10	1704: <b>Prediction of delamination migration at a 0°/θ ply interface in composite tape laminates,</b> <i>M.F. Pernice, N.V. De Carvalho, S.R. Hallett</i>	304: <b>Characterizing the energy absorption of rigid polymeric foams under compressive direct impact loading,</b> <i>A. Kidane, B. Koohbor, W-Y. Lu</i>	1509: <b>Damage behavior of stitched CFRP laminate on high-velocity rigid body impact,</b> <i>M. Nakayama, A. Yoshimura, N. Watanabe</i>	1829: <b>Multi-die, multi-stage pultrusion process for hybrid composites: degree of cure and temperature profiles,</b> <i>M. Albayati, R. Gorthala</i>	2112: <b>Micro-mechanical modelling of fiber tows prior to infiltration,</b> <i>S.E. Stapleton, L. Appel</i>	2712: <b>Molecular dynamics modeling of carbon nanotube composite fracture using ReaxFF,</b> <i>B.D. Jensen, K.E. Wise, G.M. Odegard</i>	2503: <b>A multiscale approach for progressive failure modeling of a woven composite RVE,</b> <i>F.H. Bhuiyan, R.S. Fertig III</i>	3703: <b>A single fiber peel test to measure fibrillar interactions in ultra high molecular weight polyethylene fibers,</b> <i>P.B. McDaniel, J.M. Deitzel, J.W. Gillespie, Jr.</i>	2410: <b>Through-thickness electrical conductivity of toughened CFRP laminate,</b> <i>Y. Hirano, T. Yamane, A. Todoroki</i>
11:35	2606: <b>In search of a time efficient approach to crack and</b>	305: <b>Human tissue simulants for study of traumatic brain injury (TBI),</b> <i>A.</i>		1826: <b>Specialized elastomeric tooling for resin infusion (SETRI)</b>	1301: <b>Micromechanical modeling of oxidation induced stresses</b>	2727: <b>Predicting thermo-mechanical properties of peek using</b>	2505: <b>Effect of notch-induced strain gradients on the applicability of</b>	3712: <b>Development of one unity composites,</b> <i>Y. Ogura, T. Seto,</i>	2426: <b>Self-sensing of viscoelastic phenomena in multiscale</b>

	<b>delamination growth predictions in composites</b> , R. Krueger, N.V. De Carvalho	Chanda, V. Unnikrishnan		<b>applied to bio-based composites</b> , J. Garofalo, D. Walczyk	<b>in SiC/SiC composites</b> , P. Kakanuru, K. Pochiraju	<b>reactive molecular dynamics</b> , W.A. Pisani, M. Radue, S. Chinkanjanarot, D.R. Klimek-McDonald, J.M. Tomasi, J.A. King, G.M. Odegard	<b>multiscale approaches for woven composites: combined experimental and computational investigation</b> , R.S. Fertig III, G. Monpara, D.H. Robbins Jr.	R. Marui, T. Sakai, H. Hamada	<b>composites by using the electrical resistance approach</b> , A. Can-Ortiz, J.J. Ku-Herrera, O. Rodríguez-Uicab, A. May-Pat, F. Gamboa, J.L. Abot, F. Avilés
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Lunch 12:00 to 1:20 pm – Colony ABC and Lodge Courtyard

## MONDAY 9/19 AFTERNOON

### Monday Session M3 9/19, 1:20 to 3:00 pm

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>M3</b>	<b>NAFEMS: Analysis Benchmarking</b> Chair: Ronald Krueger	<b>Bonded Joints</b> Chair: Gretchen Murri	<b>Sandwich Indentation &amp; Impact</b> Chair: Wade Jackson	<b>Model Val, Verif &amp; Uncertainty Quantification</b> Chair: Norman Knight	<b>Fatigue and Fracture</b> Chair: Andrew Makeev	<b>Progressive Damage 1</b> Chair: Stephen Clay	<b>Multiscale Modeling 3</b> Chair: Ray Fertig	<b>Space Applications</b> Chair: James Ratcliffe	<b>Multifunctional and Smart Composites 3</b> Chair: Gaurav Nilakantan
1:20	<b>The NAFEMS composites working group – an overview</b> , R. Krueger	<b>503: Failure initiation and crack growth in thick adhesive bonded composite joints: computational mechanics modeling and analysis</b> , S.S. Wang, T-P. Yu, K.H. Lo	<b>1507: Phenomenological investigation of Nomex® core damage mechanics in honeycomb sandwich panels under transverse impact and quasi-static loading</b> , K. Anagnostopoulos, H. Kim	<b>2205: On approaches to combine experimental strength and simulation with application to open-hole-tension configuration</b> , Y. Zhang, J.C. Meeker, J.F. Schutte, N.H. Kim, R.T. Haftka	<b>1103: High-toughness CFRP laminates with engineered fracture surfaces: a shark-teeth design</b> , G. Bullegas, S.T. Pinho, S. Pimenta	<b>3101: Maximum clamping force in single and double lapped joints</b> , H. Salim, A.E-D. El-Sisi, H. El-Emam, H.E-D. Sallam	<b>2504: Generalized free-edge stress analysis using mechanics of structure genome</b> , B. Peng, J. Goodsell, R.B. Pipes, W. Yu	<b>3401: Structurally optimized beams from digital composite materials</b> , X. Liu, R. Yudzinsky, A. Burke, C. Hansen	<b>2415: Analysis-driven design of vascular antennas embedded in multifunctional composites</b> , D.J. Hartl, G.J. Frank, G.H. Huff, J.W. Baur
1:45	<b>2602: Challenge problems for the benchmarking of micromechanics analysis: multiscale designer level I results</b> , J.A. Wollschlager, Z. Yuan, J. Fish	<b>504: Development of a novel health monitoring system for adhesively bonded composite joints using magneto-electric nanoparticles</b> , D. Watring, K. Yang, J. Coria, P. Wang, B. Boesl, S. Khizroev, D. McDaniel	<b>1510: Improving damage tolerance of composite sandwich structure subjected to low velocity impact loading: experimental analysis</b> , R. Gondaliya, D. Sypeck, F. Zhu	<b>2203: Multi-scale uncertainty quantification of fiber reinforced composites using polynomial chaos decomposition</b> , M. Thapa, S.B. Mulani, R.W. Walters	<b>1106: A peridynamic model for analyzing crack propagation in unidirectional composite lamina</b> , W. Zhou, D. Liu	<b>3301: Damage initiation and propagation modeling in laminated composites under fatigue loading</b> , E.V. Jarve, K.H. Hoos, D.H. Mollenhauer	<b>2506: Multiscale modeling of random microstructures in SiC/SiC ceramic matrix composites within MAC/GMC framework</b> , S.M. Arnold, S. Mital, P.L. Murthy, B.A. Bednarczyk	<b>3404: Dynamic deployment of composite tape springs</b> , A.I. Khan, E.C. Borowski, M.R. Taha	<b>2403: Carbon nanotube sheet reinforced laminated composites</b> , Y. Song, D. Chauhan, G. Hou, X. Wen, M. Kattoura, C. Ryan, V. Shanov, M. Schulz

2:10	2603: <b>Improved methods for quantifying and designing for impact damage tolerance</b> , J.C. Meeker, M. Gran, J.F. Schutte	501: <b>Mechanical properties of needle punched chopped strand mat composites</b> , D. Ichikawa, R. Marui, T. Morii, A. Ohtani	1515: <b>Energy absorption and impact response of meta-lattice truss core sandwich panels</b> , B. Li, K.T. Tan	2201: <b>Validation of surrogate model-based life prediction for a composite rotorcraft hub component</b> , D. Ao, Z.Hu, S. Mahadevan	1109: <b>Enhancement of delamination resistance by novel z-pinning for composite laminated structures</b> , A. Virakthi, S. Kwon, M.E. Robeson, S.W. Lee	101: <b>Correlation of fuselage and subcomponent panel responses using ABAQUS explicit progressive damage analysis tools</b> , K.E. Gould, A. Satyanarayana, P.B. Bogert	2509: <b>Multi-scale computational modeling of short fiber reinforced thermoplastics</b> , S. DorMohammadi, M. Repupilli, F. Abdi, Y. Wan, J. Takahashi, H. Huang	3405: <b>Identifying critical design variables and domains for design optimization of deployable tape springs for controlled deployment</b> , E.C. Borowski, A.I. Khan, M.R. Taha	2419: <b>Manufacturing of self-healing carbon-fiber / thermoplastic-toughened epoxy prepreg</b> , S. Yup Kim, N.R. Sottos, S.R. White
2:35	2605: <b>Rapid integration of new analysis methods in production</b> , H. Razi, J.D. Schaefer, S. Wanthal, J.J. Handler, G.D. Renieri, B.P. Justusson	208: <b>Additive manufacturing for bonded composite joints</b> , P. Prabhakar, R. Garcia, E. Acuna	3205: <b>An analytical model for the response of carbon/epoxy-aluminum honeycomb core sandwich structures under quasi-static indentation loading</b> , A.K. Singh, B.D. Davidson, A.T. Zehnder, B.P.J. Hasseldine	2208: <b>Lessons learned in certifying space structures</b> , V.K. Goyal, J.I. Rome, B.E. Soltz	1113: <b>Mode III cohesive fracture of a cylindrical bar in torsion</b> , Y. Song, A.J. Levy	3402: <b>Evaluation of the mechanical performance of a multi-cell composite overwrapped pressure vessel for cryogenic storage</b> , I.G. Tapeinos, D.S. Zarouchas, O. Bergsma, S. Koussios, R. Benedictus	2516: <b>Enhancement of multiscale modeling methodology for short fiber filled injection molded parts subjected to uniaxial and biaxial loadings</b> , D. Robbins, A. Morrison, R. Dalgarno	3406: <b>Analysis of advanced integrated composite thermal structures for space applications</b> , L. Dangora	2420: <b>Piezoresistive and thermoresistive response of constrained carbon nanotube yarns towards their use as integrated sensors</b> , H.H. Le, G.L. Carvalho, M.K. Bonardi, C.R. Coelho, G.E. Brodeur, M. Cen-Puc, J.J. Ku-Herrera, F. Avilés, J.L. Abot,

**Break 3:00 to 3:20 pm – Colony Foyer**

**Monday Session M4 9/19, 3:20 to 5:00 pm**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>M4</b>	<b>Advances in Modeling 1</b> Chair: Erian Armanios	<b>Armor &amp; Protection 3</b> Chair: Alexander Carpenter	<b>Textile &amp; 3D Composites</b> Chair: Gyaneshwar Tandon	<b>Manufacturing and Processing 3</b> Chair: Hamid Dalir	<b>Fatigue Testing &amp; Modeling</b> Chair: Robert Haynes	<b>Nanocomposites Manufacturing and Processing</b> Chair: Greg Odegard	<b>Multiscale Modeling 4</b> Chair: Michael Czabaj	<b>PANEL SESSION Composites in Space: Near- and Long-Term Challenges</b>	<b>Multifunctional and Smart Composites 4</b> Chair: Scott White
3:20	1601: <b>Thermal response to simulated lightning currents on stitched composite aircraft structures</b> , J. Lee, T.E. Lacy, C.U. Pittman Jr., M.S. Mazzola	303: <b>PC-based numerical modeling of ballistic impact into multi-layered nonwoven fibrous targets</b> , S.L. Phoenix, S. Eken, A.K. Yavuz	3807: <b>Simplified analytical stitch model for non-crimp fabrics</b> , H. Krieger, T. Gries, S. Stapleton	1809: <b>Composite de-tooling simulation using an improved plate and shell theory base on mechanics of structure genome</b> , O. R. Garaizar, Y. Long, J. Goodsell, W. Yu, R. B. Pipes	2511: <b>A physics-based fatigue life prediction for composite delamination subject to mode I loading</b> , K. Kuhn, R.S. Fertig III	2716: <b>Determining the controlling mechanism of electrostatically induced carbon nanotube rotation using in situ, real-time polarized Raman spectroscopy</b> , W.A. Chapkin, A.I. Taub	2513: <b>Carbon nanotube sheet scrolled fiber composite for enhanced interfacial mechanical properties</b> , P. Kokkada, S. Roy, H. Lu	CHAIR: Stephen Jurczyk, Associate Administrator, Space Technology Mission Directorate, National Aeronautics and Space Administration	2408: <b>Novel carbon nanotube-based non-woven composite sensors: processing, characterization and potential applications</b> , S.M. Doshi, E.T. Thostenson

3:45	1603: <b>Free edge effect in multi-directional laminate under uniaxial loading</b> , Md S. Islam, P. Prabhakar	3901: <b>Dynamic reverse ballistics penetration of Kevlar® fabric with different indenter geometries</b> , Z. Guo, W. Chen	3805: <b>Experimental characterization and numerical modeling of the behavior of 3D interlock textile composite used for impact loading</b> , B. Verone, M-L Dano, F. Dau, A. Gakwaya	1827: <b>Machining of FRP composite laminates with CD and UAD techniques: a comparative and experimental investigation</b> , S.O. Ismail, H.N. Dhakal, A. Roy, D. Wang, I. Popov	1111: <b>Fatigue delamination growth behavior in composite materials under block loading</b> , L. Yao, Y. Sun, R.C. Alderliesten, R. Benedictus	2717: <b>Scale-up and continuous highly aligned multi-walled carbon nanotube sheets for high-performance CNT/Bismaleimide nanocomposite</b> , A. Hao, R. Downes, K. Bui, D. Justice, S. Garcia, J.G. Park, R. Liang	2514: <b>Stochastic failure analysis of an uncorrelated volume element using extended finite element method</b> , S.H.R. Sanei, E.J. Barsotti, R.S. Fertig III	PANELISTS: Naveed Hussain, Vice President, Aeromechanics Technology, Boeing R&T  Mike Kirsch, NASA Engineering and Safety Center, National Aeronautics and Space Administration	2411: <b>Acoustic filter design using temperature tuning</b> , H. Sadeghi, A. Srivastava, A.V. Amirkhizi, S. Nemat-Nasser
4:10	3001: <b>Using optimization to improve the quasi-isotropic status quo</b> , J. Buck, E. Jayson, D. Najera	302: <b>Computational model for woven fabrics subjected to ballistic impact by a spherical projectile</b> , S. Eken, S.L. Phoenix, A.K. Yavuz	3808: <b>Influence of 3D warp interlock fabric parameters on final geometry</b> , F. Boussu, C. Chevalier, C. Kerisit, D. Coutellier	1816: <b>Smart ultrasonic welding of thermoplastic composites</b> , G. Palardy, I. Fernandez Villegas	1108: <b>Towards the fundamentals of mode II fatigue delamination growth</b> , L. Amaral, R. Alderliesten, R. Benedictus	2725: <b>Effects of the PopTube approach CNT synthesis process on the tensile properties of carbon fibers and their composites</b> , W.E. Guin, T. Horn, J. Wang	2517: <b>Low rate dynamic fracture simulation of toughening in polymers via highly ordered nanoplatelets</b> , G. Nygren, R. Karkkainen	Bill Hooper, Senior Manager, R&D Engineering, Orbital ATK  Dan Polis, Structures Integrated Product Team Lead, Sierra Nevada Corp.  Keith Belvin, Senior Researcher, Advanced Structural/Thermal Systems, NASA Langley Research Center	2418: <b>Electrical self-sensing of impact damage in multi-scale hierarchical composites by controlling the location of the carbon nanotubes</b> , B.K.S. Isaac-Medina, A. Alonzo-García, J.J. Ku-Herrera, A. May-Pat, J.I. Cauich-Cupul, F. Avilés
4:35	3002: <b>Structural optimization of composite helicopter rotor blades</b> , A.A. Isik, A. Kayran	301: <b>The ballistic impact response of flexible composite body armor</b> , A.K. Yavuz, S.L. Phoenix, S. Eken	2802: <b>Manufacturing of mycology composites</b> , S. Travaglini, C.K.H. Dharan, P.G. Ross	1821: <b>Drilling conditions on hole quality for CFRP laminates</b> , A.N. Amir, L. Ye, L. Chang	1116: <b>Strategies and numerical implementation of fatigue life models for continuous fiber reinforced polymers</b> , D. Vasiukov, A. Trameçon, S. Panier, S. Mueller		3107: <b>Progressive damage modeling of notched composites</b> , V. Aitharaju, S. Aashat, H. Kia, A. Satyanarayana, P.B. Bogert		2423: <b>A new thermally re-mendable and recyclable epoxy thermoset based on siloxane equilibration</b> , X. Yang, X. Wu, X. Zhao, Y. Zhang, R. Yu, W. Huang

**ASC Membership Meeting, 5:15 to 5:45 pm – Colony DE**

**Welcome Reception, 6:00 to 7:00 pm – Colony Foyer and Lodge Courtyard (Bar Opens at 5:30 pm)**



## TUESDAY 9/20 MORNING

Continental Breakfast 7:00 to 8:00 am – Colony ABC

**Tuesday 9/20 Plenary Session, 8:00 to 9:00 am, Colony DE**

**Speaker introduction by Barry Davidson**

**Dr. Tia Benson Tolle, Director, Advanced Materials, Boeing Commercial Aircraft**

**Presentation Title: Composites in the Mainstream**

Coffee Break 9:00 to 9:15 am – Colony ABC

**Tuesday Session T1 9/20, 9:15 to 10:30 am**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>T1</b>	<b>Static &amp; Fatigue Damage Correlation</b> Chair: Kevin O'Brien	<b>Interlaminar Properties 1</b> Chair: Gretchen Murri	<b>Impact of Fabric Composites</b> Chair: Hyonny Kim	<b>Manufacturing and Processing 4</b> Chair: Johnathan Goodsell	<b>Micromechanical Effects 1</b> Chair: Wenbin Yu	<b>Nanocomposites Characterization</b> Chair: Kristopher Wise	<b>NDE &amp; SHM 1</b> Chair: Cara Leckey	<b>Testing and Characterization 3</b> Chair: Su Su Wang	<b>Multifunctional and Smart Composites 5</b> Chair: Jandro Abot
9:15	901: <b>Identification of 4D damage precursors in 3D woven composites</b> , N.A. Castaneda, B. Wisner, J. Cuadra, A. Kontsos	206: <b>Designing and 3D printing continuous fibre-reinforced composites with a high fracture toughness</b> , Y. Swolfs, S. Pinho	103: <b>The Effects of hygrothermal aging on the impact penetration resistance of triaxially braided composites</b> , J.M. Pereira, D.M. Revilock, C.R. Ruggeri, G.D. Roberts, L.W. Kohlman, S.G. Miller	1805: <b>Investigation of collector geometry and speed on orientation, diameter distribution and mechanical properties of electrospun nanofibers</b> , M.S. Demirtas, M.C. Saha	2104: <b>Monitoring crack growth along the interface in a microdroplet specimen using non-invasive carbon nanotube sensors</b> , S. Tamrakar, S. Sockalingam, E.T. Thostenson, B.Z. Haque, J.W. Gillespie Jr.	2705: <b>Relation between morphology and thermo-elastic properties of carbon nanotube polymer/carbon fiber hybrid composites</b> , O.G. Kravchenko, R. Misiego, X. Qian, S.G. Kravchenko, R.B. Pipes, I. Manas-Zloczower	2908: <b>Precursor damage inception quantification in composites using coda wave interferometry based on Taylor series expansion technique</b> , S. Patra, S. Banerjee	3705: <b>Experimental characterization of progressive damage in countersunk composite laminates loaded in bearing</b> , A. Popescu, S. Venkataraman	SESSION KEYNOTE: <b>Multifunctional Composites for Next Generation Remotely Piloted Vehicle Concepts</b> , Jeffery Baur, AFRL
9:40	902: <b>Damage precursor detection and identification in composite structures</b> , R. Haynes, T. Henry, D. Cole, V. Weiss	207: <b>Interlayer fracture toughness of additively manufactured unreinforced and carbon-fiber-reinforced Acrylonitrile Butadiene Styrene</b> , D. Young, J. Kessler, M. Czabaj	1520: <b>Experimental studies on the impact response of 3D fiberglass fabric subject to different size impactors</b> , Z. Asaee, F. Taheri	1815: <b>The effects of a low areal weight inter-layer tackifier on saturated permeability of carbon fabrics</b> , S. Sommerlot, T. Luchini, A. Loos	2107: <b>A finite element study of dynamic stress concentrations due to a single fiber break in a unidirectional composite</b> , R. Ganesh, S. Sockalingam, B.Z. Haque, J.W. Gillespie Jr.	2718: <b>Characterization of hybrid carbon nanotube/carbon fiber polymer composites</b> , J.H. Kang, R.J. Cano, H. Luong, J.G. Ratcliffe, B.W. Grimsley, E.J. Siochi	2903: <b>On quantitative coda wave NDE for carbon-fiber reinforced polymers</b> , R. Livings, V. Dayal, D. Barnard	3711: <b>Digital image correlation as an improved technique for adhesive shear strain measurement in the ASTM D5656 test</b> , J. Van Blitterswyk, R.G. Cole, J. Laliberté, D. Backman	2401: <b>Carbon fiber sensors for strain and temperature measurement of composite overwrapped pressure vessels</b> , E. Wen, D. Cottrell, A. Cowdry
10:05	1107: <b>Experimental investigation on the correlation</b>	1703: <b>Characterizing and predicting the effects of</b>	1504: <b>Mechanical behavior and damage kinetics of woven E-</b>	1811: <b>Effect of adding GFRTF prepreg sheet on the properties of</b>	2105: <b>On the role of shear transfer mechanisms in the longitudinal</b>	2729: <b>Characterization of Nanosilica filled Bis F</b>	2909: <b>Nondestructive evaluation of adhesive bonds</b>	3714: <b>On the relationship between fracture toughness and</b>	2417: <b>Sustained release of bioactive compounds from</b>

between damage and thermal conductivity of CFRP, A. Tessema, N.Mymers, R. Patel, S. Ravindran, A. Kidane	weave geometry on mode I fracture toughness of composites, S. Baril-Gosselin, C. Li	glass/vinylester laminate composites under high strain rate: experimental and numerical investigation, M. Tarfaoui	CFRTP panel in which fine cut group was induced to prepreg, H. Hira, Y. Oe, A. Takeuchi	tensile failure of CFRP composites, S.T. Pinho, G. Bullegas, S. Pimenta	Epoxide with Diamino Diphenyl Sulfone Curing agents, A. Vashisth, C.E. Bakis	via ultrasonic phase measurements, H.A. Haldren, D.F. Perey, W.T. Yost, K.E. Cramer, M.C. Gupta	specimen thickness for quasi-isotropic carbon/epoxy laminates, X. Xu, A. Paul, M.R. Wisnom	polymer microcapsules for smart dental composites, M. Yourdkhani, N. Sottos, S. White
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**Coffee Break 10:30 to 10:45 am – Colony Foyer**

**Tuesday Session T2 9/20, 10:45 am to noon**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>T2</b>	<b>Sandwich Property Characterization</b> Chair: Chiara Bisagni	<b>Interlaminar Properties 2</b> Chair: Michael Wisnom	<b>Impact Damage Residual Strength</b> Chair: Michael Pereira	<b>Manufacturing and Processing 5</b> Chair: Johnathan Goodsell	<b>Micromechanical Effects 2</b> Chair: Silvestre Pinho	<b>Applications to Graphene</b> Chair: Benjamin Jensen	<b>NDE &amp; SHM 2</b> Chair: Russell (Buzz) Wincheski	<b>Testing and Characterization 4</b> Chair: Charles Bakis	<b>Multifunctional and Smart Composites 6</b> Chair: Samit Roy
10:45	3211: <b>In-plane shear characterization of sandwich laminates using a picture-frame test configuration</b> , F.C. Stoll, N.G. Johnston	1706: <b>A modified edge crack torsion test for measurement of mode III fracture toughness of laminated tape composites</b> , M. Czabaj, B.D. Davidson, J. Ratcliffe	1502: <b>Isogeometric analysis of damage and residual-strength in aerospace composite structures subjected to low-velocity impact</b> , M.S. Pigazzini, Y. Bazilevs, D.J. Benson, H. Kim, A. Ellison	1808: <b>Manufacturing energy intensity and opportunity analysis for fiber-reinforced polymer composites and other lightweight materials</b> , H.P.H. Liddell, S.B. Brueske, A.C. Carpenter, J.W. Cresko	3802: <b>Role of inelastic transverse compressive behavior on Kevlar KM2 single fiber transverse impact</b> , S. Sockalingam, J.W. Gillespie Jr, M. Keefe	2715: <b>Predicting thermal conductivity of graphene nanoplatelet/ epoxy nanocomposite using non-equilibrium molecular dynamics</b> , S. Chinkanjanarot, M.S. Radue, D.R. Klimek-McDonald, S. Gowtham, J.A. King, G.M. Odegard	2913: <b>Acoustic emission of large PRSEUS structures</b> , M.R. Horne, P.D. Juarez	3710: <b>Effects of density and cell rise ratio on compressive stiffness and strength of PVC structural foam</b> , A. Miyase, K.H. Lo, S.S. Wang	2422: <b>Crashworthiness of microvascular fiber-reinforced composites</b> , S.J. Pety, N.R. Sottos, S.R. White
11:10	3201: <b>The separated end notched flexure test for mode II fracture toughness characterization of sandwich composites</b> , Z.D. Bluth, J.M. Bluth, D.O. Adams	1707: <b>Prediction of energy release rates for echelon crack formation in mode III delamination toughness tests</b> , A.L. Horner, B.D. Davidson	1503: <b>Micro-CT inspection of impact damage in carbon/epoxy rods</b> , L.C. Stanford, D.W. Jensen	1810: <b>An overview of the NIST FIBERS roadmap to advance the state of composites manufacturing in the U.S.</b> , J. Sherwood, C. Hansen, P. Drane, J. Gorczyca, K. White, E. Reynaud, D. Walczyk, S. Advani, V. Dayal, M. Overcash, B.	2109: <b>High strain flexural characterization of thin CFRP unidirectional composite lamina</b> , M.E. Peterson, T.W. Murphey	2726: <b>Accelerated hydrothermal aging of cycloaliphatic epoxy/graphene nanoparticle composites</b> , J.M. Tomasi, I.D. Helman, W.A. Pisani, D.R. Klimek-McDonald, S. Chinkanjanarot, I. Miskioglu, J.A. King, G.M. Odegard	2911: <b>Delamination detection using guided wave phased arrays</b> , Z. Tian, L. Yu, C. Leckey	3715: <b>Thermal and thickness effects in para-aramid core</b> , S.S. Daggett, J.J. Fuller	2405: <b>Molecular dynamics study for experimental design guideline of dimeric anthracene-based mechanophore in the thermoset polymer matrix</b> , B. Koo, A. Chattopadhyay, L. Dai

				<i>Kinsey, T. Gross, D. Lashmore, I. Tsukrov, S. Nutt, R. Boeman, T. Dobbins, D. Coughlin, A. Schoenberg, S. Von Vogt</i>					
11:35	<b>3208: Single cantilever beam test for honeycomb sandwich materials with very thin facesheets – effects of test conditions and material properties.</b> <i>R. Schäuble, M. Petersilge, R. Schlimper</i>		<b>1512: Simulation of barely visible impact damage (BVID) and compression after impact (CAI) strength of carbon fiber reinforced composite laminates.</b> <i>S. Joglekar, M. Pankow, V. Ranatunga</i>	<b>1804: Semi empirical modeling of magnetic field assisted ED machining of metal matrix composites.</b> <i>P.S. Bains, S.S. Sidhu, H.S. Payal</i>	<b>2110: Load-transfer-based micromechanical simulation for evaluating elastic-plastic response of discontinuous carbon fiber reinforced thermoplastics.</b> <i>M. Nishikawa, A. Fukuzo, N. Matsuda, M. Hojo</i>	<b>2728: Molecular dynamics model of graphene nanoplatelet in EPON 862/DETDA polymer.</b> <i>O. Aluko, S. Gotham, G.M. Odegard</i>	<b>2921: A low cost microwave imaging system using a 6-port reflectometer for NDE of composites.</b> <i>M. Saybolt, S. Mukherjee, L. Udpa, P. Chahal</i>	<b>3716: Tensile behavior of compression molded glass microballoon/HD PE syntactic foams.</b> <i>M.L. Jayavardhan, B.R.B. Kumar, M. Doddamani, S.E. Zeltmann, N. Gupta</i>	<b>2409: Icing protection system for composite structures using carbon fiber heating elements.</b> <i>A. Laroche, A. Dolatabadi, S.V. Hoa</i>

**Lunch 12:00 to 1:20 pm – Colony ABC and Lodge Courtyard**

## TUESDAY 9/20 AFTERNOON

### Tuesday Session T3 9/20, 1:20 to 3:00 pm

	<b>Allegheny A</b>	<b>Allegheny B</b>	<b>Allegheny C</b>	<b>Tidewater A</b>	<b>Tidewater B</b>	<b>Tidewater C</b>	<b>Tidewater D</b>	<b>Piedmont BC</b>	<b>Colony DE</b>
<b>T3</b>	<b>Symposium in Memory of Jeffery Schaff</b> Chair: Barry Davidson	<b>Automotive Composites 1</b> Chair: Liangkai Ma	<b>Effects of Defects 1</b> Chair: Silvestre Pinho	<b>Marine Composites</b> Chair: Dayakar Penumadu	<b>Civil Structural Elements &amp; Systems</b> Chair: Riyad Aboutaha	<b>Progressive Damage 2</b> Chair: Nelson De Carvalho	<b>NDE &amp; SHM 3</b> Chair: Dan Perey	<b>Testing and Characterization 5</b> Chair: Bhawesh Kumar	<b>Multifunctional and Smart Composites 7</b> Chair: Francis Aviles
1:20	<b>3302: Design and testing of damage tolerant composite airframe.</b> <i>J. Garhart, K. Schnappauf</i>	<b>401: Predicting the strength and failure envelopes of high-performance discontinuous composites.</b> <i>S. Pimenta, Y. Li</i>	<b>1003: Fatigue behavior of unidirectional carbon/epoxy AFP laminates containing gaps.</b> <i>Y. Elsherbini, S.V. Hoa</i>	<b>1902: Characterization of water-epoxy interactions with spectroscopic methods in epoxy.</b> <i>G. Monpara, M.W. McKee, R.S. Fertig III</i>	<b>601: Behavior of single and double bolted staggered joint in thick composite plates</b> <i>A.E-D. El-Sisi, H. El-Emam, H. Salim, H.E-D. Sallam, O.M. El-Hussieny</i>	<b>3116: Meso-scale constitutive response of woven composites subjected to large deformation.</b> <i>B. Koohbor, A. Kidane</i>	<b>2915: Ultrasonic NDE simulation for composite manufacturing defects.</b> <i>C. Leckey, P.D. Juarez</i>	<b>4106: Tribological behavior of PTFE/PEEK composite.</b> <i>S. Qu, J. Penaranda, S.S. Wang</i>	<b>2416: Precise monitoring of damage evolution in laminated composite materials using integrated carbon nanotube fiber sensors: experimental results and validation.</b> <i>J.L. Abot, J.C. Anike, S.P. Mortin, J. Bills, V. Gonzaga, G. Oliveira, P. Silva, R. Araujo, V. Barbosa, E. Akay, K. Belay</i>

1:45	3303: <b>Multi-scale simulation of delamination migration</b> , <i>D. Mollenhauer, E. Zhou, K. Hoos, E. larve, M. Braginsky, T. Breitzman, D. Rapking</i>	403: <b>Characterization and modeling of progressive damage in angle-ply composite laminates under varying strain rate loading</b> , <i>J.D. Schaefer, B.T. Werner, I.M. Daniel</i>	1002: <b>Effects of interfacial defects on properties of laminated composite materials and their bonded joints</b> , <i>J. Clifford, P. Majumdar, P. Katiyar, R. Wilkes</i>	1904: <b>Flexural, thermomechanical and low-velocity impact studies of CFRP composites with nanoclay and multiwalled carbon nanotubes</b> , <i>M. Hosur, T. Mahdi, E. Islam, S. Jeelani</i>	602: <b>Effect of pre-strained CFRP composite patch on cracked steel plates</b> , <i>H.M. El-Emam, A.E. Elsis, H.A. Salim, M.H. Seleem, H.E-D. M. Sallam</i>	3110: <b>Identification of material parameters for damage model of ductile failure in thermoplastic polymers</b> , <i>A. Sheidaei, F. Pourboghrat, T. Park, F. Abu-Farha</i>	2912: <b>Benchmarking of computational models for NDE and SHM of composites</b> , <i>K. Wheeler, C. Leckey, V. Hafiychuk, P. Juarez, D. Timucin, S. Schuet, H. Hafiychuk</i>	3713: <b>Four probe electrical resistance characterization of carbon fiber and carbon nanotube buckypaper composites</b> , <i>R.J. Hart, O.I. Zhupanska</i>	2414: <b>Electro-mechanical simulation of multifunctional composite structural batteries</b> , <i>D.B. Perez, R.L. Karkkainen</i>
2:10	3304: <b>Probabilistic characterization of interlaminar toughness for reliability analysis of aircraft composite structures</b> , <i>M.R. Gurvich, P.L. Clavette, M.E. Robeson</i>	412: <b>Development of a constitutive material model with progressive failure and damage for woven thermoplastic composites</b> , <i>H. Kuhlmann, P. Volgers, Z. Zhang</i>	1006: <b>Experimental study of laminated composites containing manufacturing defects under combined stress states</b> , <i>H.T. Ali, M.I. Jones, L.F. Kawashita, S.R. Hallett</i>	1906: <b>Flexural investigation of woven composites with sea water exposure</b> , <i>R. Garcia, A.G. Cabral, P. Prabhakar</i>	603: <b>Analysis of laminated composite stiffener with unsymmetrical C-section</b> , <i>W.S. Chan</i>	2604: <b>Estimating the process zone length of fracture tests</b> , <i>J. Xie, A.M. Waas, M. Rassaian</i>	2910: <b>DPSM modeling of wave propagation in anisotropic half space</b> , <i>S. Shrestha, S. Banerjee</i>	3706: <b>Similitude analysis of the strain field for loaded composite I-beams emulating wind turbine blades</b> , <i>M.E. Asl, C. Niezrecki, J. Sherwood, P. Avitabile</i>	2427: <b>Toughness enhancement mechanisms in polymer nanocomposites due to length scale effects at the nanoscale</b> , <i>S. Roy, A. Kumar</i>
2:35	3305: <b>Fatigue damage accumulation under biaxial cyclic loading of off-axis composites</b> , <i>V. Strizhius</i>	803: <b>A mesh insensitive composite damage model for crash simulations</b> , <i>S. Müller, A. Tramecon, P. de Luca</i>	1008: <b>Effect of manufacturing induced fiber break on local tensile failure in composites</b> , <i>L. Zhuang, R. Talreja, J. Varna</i>	1905: <b>Compressive behavior of cenosphere/HDP E syntactic foams under different strain rates</b> , <i>B.R. Bharath Kumar, A.K. Singh, M. Doddamani, D.D. Luong, N. Gupta</i>	606: <b>Testing FRP bridge decks</b> , <i>J. O'Connor, A. Aref, S. Ayers, M. Lopez</i>	3106: <b>Observations and lessons learned from composite progressive damage analysis benchmarking exercise</b> , <i>S. Clay, S. Engelstad</i>	2914: <b>Model-based inversion of flash thermography nondestructive evaluation measurements of composites</b> , <i>S.D. Holland, E. Gregory, B. Schiefelbein</i>	2425: <b>Piezoresistive response of carbon nanotube yarns: experimental characterization and phenomenology</b> , <i>J.C. Anike, K. AlHamdan, K. Belay, J.L. Abot</i>	

**Break 3:00 to 3:20 pm – Colony Foyer**

**Tuesday Session T4 9/20, 3:20 to 5:00 pm**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC	Colony DE
<b>T4</b>	<b>Advances in Modeling 2</b> Chair: Pavana Prabhakar	<b>Automotive Composites 2</b> Chair: Venkat Aitharaju	<b>Natural, Bio, Green &amp; Novel Composites</b> Chair: Mihaela Banu	<b>Molecular Modeling</b> Chair: Benjamin Jensen	<b>Civil Transportation Infrastructure</b> Chair: Steve Ayers	<b>Progressive Damage 3</b> Chair: Stephen Hallett	<b>Composites Education</b> Chair: Rani Sullivan	<b>PANEL SESSION</b> <b>Certification Efficiency of Composite Structure for Aircraft:</b> <b>Lessons Learned and Current Issues</b>	<b>Stability &amp; Postbuckling</b> Chair: Cheryl Rose
3:20	2204: <b>Flexural stiffness of thick walled composite tubes</b> , S.V. Hoa, E.G. Ahmed, C. Zhang	407: <b>Experimental methods to characterize the woven composite prepreg behavior during the preforming process</b> , W. Zhang, H. Ren, J. Lu, Z. Zhang, L. Su, Q.J Wang, D. Zeng, X. Su, J. Cao	2801: <b>Studies on the synthesis and characterization of epoxidized soybean oil</b> , S. Meadows, C. Young, D. Abugri, M. Hosur, S. Jeelani	2301: <b>Effect of adding boron nitride nanotubes on mechanical properties of Epoxy 862 nanocomposite</b> , M. Ghazizadeh, J.E. Estevez, A.D. Kelkar, J.G. Ryan	604: <b>Achieving worldwide code acceptance for the use of advanced composite materials to strengthen civil structures</b> , S. Arnold, E. Meriwether	3118: <b>Characterization of energy dissipation in fiber/matrix composites under transverse tension</b> , M.K. Ballard, J.D. Whitcomb	701: <b>Public speaking and media interactions: Avenues for outreach and dissemination of research outcomes</b> , N. Gupta	CHAIR: Curtis Davies, Program Manager, Joint Advanced Materials and Structures Center of Excellence, Federal Aviation Administration	3503: <b>Buckling tests of sandwich cylindrical shells with and without cut-outs</b> , C. Bisagni
3:45	4104: <b>Modelling of variable stiffness plates based on mechanics of structure genome</b> , Y. Long, W. Yu	413: <b>An Evaluation of the *FABRIC material model in ABAQUS/ EXPLICIT for composite preforming analysis suitability</b> , L. Ma, J. Tudor, J. Zawisza	2803: <b>Mode I interlaminar fracture toughness of natural fiber stitched flax/epoxy composite laminates – Experimental and numerical analysis</b> , M. Ravandi, W.S. Teo, L.Q.N. Tran, M.S. Yong, T.E. Tay	2303: <b>Multidisciplinary optimization of cross-linked polymers based on molecular dynamics simulation</b> , Y. Oya, K. Tanabe, G. Kikugawa, T. Okabe	607: <b>Finite Element analysis into the flexural response of CFRP strengthened prestressed concrete girders</b> , B. Yan, T. Bai, R.S. Aboutaha, H. Ataei	3103: <b>Progressive failure analysis of a stack of aligned prepreg platelets</b> , S.G. Kravchenko, D.E. Sommer, R.B. Pipes	702: <b>Uniting composite manufacturing theory and application: practical manufacturing methods in a team-based curriculum</b> , M. Knauf, E. Barocio, J.D Miller, M. Prall, O.R. Garaizar, D. Sommer, O. Wingfield, N.D. Sharp, R. Sterkenburg, R.B. Pipes	PANELISTS: William Nickerson, Sea-Based Aviation Structures and Materials, Office of Naval Research  Greg Schoeppner, Structures Technical Advisor, Life Cycle Management Center, United States Air Force  Carl Rousseau, Senior Staff Engineer, Lockheed Martin Aeronautic FTW	3504: <b>Dynamic instability of antisymmetric cross-ply laminated composite rectangular thin plates based on large deflections theory</b> , M. Darabi, R. Ganesan
4:10	4107: <b>Analytical modeling for stress distribution around composite interference fit joints with elastic pins</b> , T. Wu, K. Zhang, H. Cheng, P. Liu, Y. Liang, Y. Li	4101: <b>Technical challenges and R&amp;D needs for compressed hydrogen storage on-board fuel cell electric vehicles</b> , J.J. Gangloff Jr., G. Ordaz, J. Adams, N. Stetson		2304: <b>Molecular dynamics study of the mechanical properties of silica glass using ReaxFF</b> , S.C. Chowdhury, R.M. Elder, T.W. Sirk, B.Z. Haque, J.W. Andzelm, J.W. Gillespie Jr.	608: <b>Shear resistance of GFRP composite bars for concrete pavement joints</b> , J. Xu, C. Tan, R. Aboutaha	3117: <b>An efficient virtual testing framework to simulate the interacting effect of intra-laminar and inter-laminar damage progression in composite laminates</b> , M. Shahbazi, R. Vaziri, N. Zobeiry	703: <b>The Composites Design and Manufacturing HUB: Advancing composites education in the classroom</b> , J. Goodsell, W. Yu	Stephen Scotti, Langley Senior Technologist for Advanced Materials & Structural Systems, NASA Langley Research Center	3505: <b>Buckling design and imperfection sensitivity of sandwich composite launch-vehicle shell structures</b> , M.R. Schultz, D.W. Sleight, D.E. Myers, W.A. Waters Jr., P.B. Chunchu, A.E. Lovejoy, M.W. Hilburger



4:35	3113: <b>Plasticity tool for predicting shear nonlinearity of unidirectional laminates under multiaxial loading</b> , J.T. Wang, G.F. Bomarito	411: <b>Lightweight sheet molding compound (SMC) composites containing cellulose nanocrystals</b> , A. Asadi, M. Miller, A.V. Singh, R.J. Moon, K. Kalaitzidou		2305: <b>Molecular modeling of crosslinked high-temperature bismaleimide resins: Matrimid-5292</b> , M.S. Radue, V. Varshney, J.W. Baur, A.K. Roy, G.M. Odegard	609: <b>Ductility of CFRP strengthened reinforced concrete flexural members</b> , C. Tan, J. Xu, R. Aboutaha	3112: <b>Progressive damage and failure analysis of composite laminates using XFEM/CZM coupled approach</b> , R. Higuchi, T. Okabe, K. Yoshioka, T. Nagashima	704: <b>Design, build, test of composites for supersonic ping pong balls</b> , M. Pankow	Mark Robeson, Aviation Development Directorate, United States Army  Larry Ilcewicz, Chief Scientist and Technical Advisor, Federal Aviation Administration	3506: <b>Delamination buckling response of 3D fiber-metal laminates subjected to different loading rates</b> , D. De Cicco, F. Taheri
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**ASC Technical Division Meetings 5:15 to 5:45 pm**

Analysis & Testing Div. – Tidewater A, Durability & Damage Tolerance Div. – Tidewater B  
Emerging Composites Technologies Div. – Tidewater C, Design & Manufacturing Div. – Tidewater D

**Pre-Banquet Social Hour, 6:00 to 6:30 pm, Colony Foyer and Lodge Courtyard (Bar Opens at 5:30 pm)**

**ASC Awards Banquet Dinner, 6:30 to 9:30 pm, Colony Room**

Served Dinner and Dessert

After Dinner Presentation: Astronaut Dr. Nancy Currie-Gregg, *Engineering Challenges in Human Spaceflight*

**CCM Medal of Excellence and ASC Awards Presentations**

**WEDNESDAY 9/21 MORNING**

**Continental Breakfast 7:00 to 8:00 am – Colony ABC**

**Wednesday 9/21 Plenary Session, 8:00 to 9:00 am, Colony DE**

**Dr. Jack Gillespie, University of Delaware Center for Composite Materials – Recipient of ASTM D30 Wayne W. Stinchcomb Memorial Award  
Presentation Title: Carbon/Thermoplastic Composites for Automotive Applications**

**Coffee Break 9:00 to 9:15 am – Colony ABC**

**Wednesday Session W1 9/21, 9:15 to 10:30 am**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC
<b>W1</b>	<b>Sandwich Performance Improvements</b> Chair: Abhendra Singh	<b>Automotive Composites 3</b> Chair: Danielle Zeng	<b>Dynamic Response Modeling</b> Chair: K.T. Tan	<b>Manufacturing and Processing 6</b> Chair: Scott Stapleton	<b>Materials for Durability &amp; Damage Tol 1</b> Chair: Kishore Pochiraju	<b>Progressive Damage 4</b> Chair: John Whitcomb	<b>NDE &amp; SHM 4</b> Chair: Dogan Timucin	<b>D30.09 Sandwich Construction Technical Committee Meeting</b>
9:15	1105: <b>Influence of multiwalled carbon nanotube on interfacial fatigue performance of glass epoxy polyvinyl chloride core sandwich composites</b> , A.K. Patra, N. Mitra	409: <b>3D representative volume element reconstruction of fiber composites via orientation tensor and substructure features</b> , Y. Li, W. Chen, X. Jin, H. Xu	1807: <b>Free vibration of doubly tapered laminated composite beams using hierarchical finite element method</b> , A. Fazili, R. Ganesan	1820: <b>Modeling of resin transfer molding of carbon fiber composites</b> , V. Aitharaju, H. Yu, S. Zhao, J. Owens, P. Pasupuleti, M. Doroudian	2002: <b>Evolution of damage mechanisms and remaining properties in carbon fiber composite materials</b> , P.K. Majumdar, J. Clifford, H. Goman, K. Epley	106: <b>A continuum damage mechanics model to predict kink-band propagation using deformation gradient tensor decomposition</b> , A. C. Bergan, F.A. Leone Jr.	2916: <b>Fiber orientation assessment on laminated carbon fiber composites using eddy current probe</b> , R. Wincheski, S. Zhao, L. Berger	
9:40	3204: <b>The influence of surface finishing of core on the impact behaviour of polymer foam-cored sandwich structures</b> , C. Kaboglu, S. Pimenta, A. Morris, J.P. Dear	404: <b>Crush analysis of compression modeled chopped fiber tubes</b> , S. DorMohammadi, D. Huang, M. Repupilli, F. Abdi, Y. Song, U. Gandhi	3601: <b>Hygrothermal analysis of composite beams under moving loads</b> , M. Hanif, N.T. Sivaneri	1813: <b>Simulation of the automation of composite wind turbine blade manufacture</b> , M. Polcari, J. Sherwood	2005: <b>Hybridization strategy for improving damage tolerance of three phase composites</b> , E. Selver, P. Potluri	104: <b>Analysis and characterization of damage and failure utilizing a generalized composite material model suitable for use in impact problems</b> , R.K. Goldberg, K.S. Carney, P. DuBois, B. Khaled, C. Hoffarth, S. Rajan, G. Blankenhorn	2919: <b>Advances in in-situ inspection of automated fiber placement systems</b> , P.D. Juarez, K.E. Cramer, J.P. Seebo	
10:05	3212: <b>Strengthening of honeycomb cardboard by FRP as promising green panels</b> , W.K. Ahmed, A. Hilal-Alnaqbi, A. Hallalo, A. Altelbani	804: <b>Modeling of crush behavior of carbon fiber composites</b> , V. Aitharaju, H.G. Kia, S. Aashat, V.C. Pulugurtha	1501: <b>Failure analysis of composite beams under moving loads</b> , N.T. Sivaneri, M. Hanif	1822: <b>Understanding and prediction of fibre waviness defect generation</b> , S.R. Hallett, J.P.-H. Belnoue, O.J. Nixon-Pearson, T. Mesogitis, J. Kratz, D.S. Ivanov, I.K. Partridge, K.D. Potter	2009: <b>Modeling, synthesising and testing nacre-inspired CFRP structures for improved damage tolerance</b> , F. Narducci, S.T. Pinho	3114: <b>Modelling failure mechanisms in composites subjected to impact and post-impact compression</b> , M.R. Abir, T.E. Tay, H.P. Lee	2920: <b>Development of a fully automated guided wave system for in-process cure monitoring of CFRP composite laminates</b> , T.B. Hudson, B.W. Grimsley, F-G. Yuan	

**Coffee Break 10:30 to 10:45 am – Colony Foyer**

**Wednesday Session W2 9/21, 10:45 am to noon**

	Allegheny A	Allegheny B	Allegheny C	Tidewater A	Tidewater B	Tidewater C	Tidewater D	Piedmont BC
<b>W2</b>	<b>Sandwich Experiments and Modeling</b> Chair: Daniel Adams		<b>Effects of Defects 2</b> Chair: Caihua Cao	<b>Manufacturing and Processing 7</b> Chair: Suong Hoa	<b>Materials for Durability &amp; Damage Tol 2</b> Chair: David Mollenhauer	<b>Institute for Adv Comp Manuf Innovation</b> Chair: Mrinal Saha	<b>NDE &amp; SHM 5</b> Chair: Peter Juarez	<b>D30.04 Lamina and Laminate Test Methods Technical Committee Meeting</b>
10:45	<b>3202: Mechanical performance of repaired sandwich panels: Experimental characterization and finite-element modelling, E. Ghazali, M-L. Dano, A. Gakwaya, C-O. Amyot</b>		<b>1005: Heterogeneous fracture mechanics representations of the effects of defects from manufacturing to end of life, V. Vadlamudi, K. Reifsnider, Md. R. Raihan, F. Rabbi</b>	<b>1802: Evaluation of tow-steering effects – mechanical coupon testing, B. Smith</b>	<b>2007: Effect of fiber-orientation on the long-term thermo-oxidative degradation in composite laminates, J. Liang, K. Pochiraju</b>	<b>1401: Characterization inspired manufacturing of carbon fiber composites considering multiscale response, D. Penumadu, J.D. Aldrin, D.S. Forsyth, J.T. Kant, S.A. Young, N.K. Meek</b>	<b>2905: Automated data analysis algorithms for ultrasonic nondestructive evaluation of complex composite panels, J.C. Aldrin, D.S. Forsyth, J.T. Welter</b>	
11:10	<b>3209: Composite box-beam failure modes and strength: 3D modeling and analysis and comparison with experimental results, T. Yu, A. Miyase, K.H. Lo, S.S. Wang</b>		<b>1004: Multiscale analysis of stitched CFRP composites including the effect of geometrical imperfection, A. Yoshimura, A.M. Waas, H. Fukui, M. Nakayama, R. Matsuzaki</b>	<b>1814: Dynamic mechanical analysis of cenosphere/HDP E syntactic foams, S.E. Zeltmann, N. Gupta, B.R.B. Kumar, M. Doddamani</b>	<b>2010: Pseudo-ductile hybrid composites with overload sensing capability, M.R. Wisnom, G. Czél, M. Jalavand, K.D. Potter</b>	<b>1403: Cure monitoring of carbon fiber reinforced composite via laser vibrometry, L. Prozorovska, R. Bond, D. Adams</b>	<b>2904: A roadmap to account for potential uncertainties in non-destructive testing during structural health monitoring of composites, A.S. Milani, D. Frey, R. Seethaler, J. Ramkumar, B. Crawford, H. Teimouri, F. Islam, P. Pal</b>	
11:35	<b>3207: The mechanical behavior of foam-filled corrugated core sandwich panels in lateral compression, M.R.M. Rejab, D. Bachtiar, J.P. Siregar, P. Paruka, S.H.S.M. Fadzullah, B. Zhang, W.J. Cantwell</b>		<b>1001: Coupling process and structural simulations in crash application, M. Rouhi, S. Costa, M. Wysocki, R. Gutkin</b>	<b>1828: Microvoid formation in fiber tows with non-uniformly spaced fibers, M. Yeager, P. Simacek, S.G. Advani</b>	<b>2011: Mechanical properties of hierarchical discontinuous composites, J. Henry, S. Pimenta</b>	<b>1405: A special case of the Brinkman equation for 2D flow in composite laminates, N. Sharp, R.B. Pipes</b>	<b>2918: Numerical simulation of induction thermography on a laminated composite panel, G. Li, M. Genest</b>	

## WEDNESDAY 9/21 AFTERNOON

### NASA Langley Research Center Tour

*For those that are preregistered only*

Check-in at the Conference Registration Desk 7:30 am – noon today to obtain your tour wrist band

Assemble in front of Williamsburg Lodge at 12:30 pm

**Buses depart at 12:45 pm.**

*You must have a tour wrist band to board the bus.*

**Buses return at approximately 6:15 pm.**

## THURSDAY 9/22

### ASTM D30 Technical Committee Meetings – Piedmont BC

8:00 – 9:00 am	D30.90 Executive
9:00 – 9:15 am	<i>Break</i>
9:15 – 10:30 am	D30.06 Interlaminar Properties
10:30 – 11:30 am	D30.01 Editorial and Resource Standards
11:30 – 12:15 pm	<i>Lunch (on your own)</i>
12:15 – 1:15 pm	D30.02 Research and Mechanics & D14.80 on Metal Bonding Adhesives
1:15 – 2:15 pm	D30.03 Constituent/Precursor Properties
2:15 – 2:30 pm	<i>Break</i>
2:30 – 3:30 pm	D30.05 Structural Test Methods
3:30 – 4:30 pm	D30.10 Composites for Civil Structures
4:30 – 4:45 pm	<i>Break</i>
4:45 – 5:45 pm	D30 Main Committee

## Notes



