

Conference Agenda

Day 1 | Wednesday, May 13, 2026

Register or learn more [here](#)

8:15 AM							
Registration, Coffee & Breakfast in Sponsor Exhibit Area and 3DEXPERIENCE Playground							
	Advanced Seminar Room: GOLD	Advanced Seminar Room: COPPER	Advanced Seminar Room: SILVER	Advanced Seminar Room: BRONZE	Advanced Seminar Room: AMETHYST	Advanced Seminar Room: EMERALD	Advanced Seminar Room: CORAL
9:15 AM*	Structures Session 1: Practical Nonlinear Finite Element Analysis with Abaqus	Multibody System Dynamics Session 1: Multibody and Motion Technology: Current State and Motion Roles on the 3DEXPERIENCE Platform	Fluids Session 1: PowerFLOW Native Thermal Solver Session 2: PowerFLOW Advanced Common Model on 3DEXPERIENCE	Multiphysics Session 1: SIMULIA Multiphysics Simulation Framework Session 2: Electromechanical Systems Modeling	Electromagnetics Session 1: Electromagnetic Simulations for the T&M Industry: An Overview Session 2: Electromagnetics Focus Application: EMC/EMI	Modeling & Simulation Session 1: MODSIM Foundations	Manufacturing Process Simulation Session 1: SIMULIA Manufacturing Process Simulation Overview Session 2: Drilling Process Optimization Using Parametric Design Study Session 3: Welding Simulation Using Abaqus
10:45 AM							
Morning Break in Sponsor Exhibit Area and 3DEXPERIENCE Playground							
	Advanced Seminar Room: GOLD	Advanced Seminar Room: COPPER	Advanced Seminar Room: SILVER	Advanced Seminar Room: BRONZE	Advanced Seminar Room: AMETHYST	Advanced Seminar Room: EMERALD	Advanced Seminar Room: CORAL
11:15 AM*	Structures Session 2: A General Review of Fatigue Assessments, Including the Recent Trends of AI/ML Adoption on Fatigue	Multibody System Dynamics Session 2: SIMPACK Realtime and ADAS applications	Fluids Session 3: Modeling and Simulation (MODSIM) of Heat Exchangers Session 4: PowerFLOW Multiphase, Multispecies and Erosion Capabilities	Multiphysics Session 3: Fluid Structure Interaction (FSI) in 3DEXPERIENCE Platform Session 4: 3D Multiphysics-Multiscale Modeling and Simulation of Battery Cells and Packs	Electromagnetics Session 3: Electromagnetics Focus Application: Motor Design and Acoustic Noise Control Session 4: Electromagnetics Focus Application: Electro-Thermal Co-Simulation	Modeling & Simulation Session 2: MODSIM Advanced	Manufacturing Process Simulation Session 4: Composite Curing Simulation Session 5: Semiconductor Manufacturing Process
12:45 PM							
Plated Lunch, Sponsor Exhibit Area & Playground Open – Sponsored by VIAS3D							
1:45 PM							
Welcome & Opening Remarks, Mark Bohm, Dassault Systèmes							
1:55 PM							
SIMULIA Brand Insights 2026, Michelle Ash, Dassault Systèmes SIMULIA CEO							
2:15 PM							
Keynote Presentation: Learning the Physical World: Neural Models for Simulation and Design, Professor Hadi Meidani, University of Illinois at Urbana-Champaign							
2:45 PM							
Roundtable Discussion: Partnerships to Build Industrial AI Platforms for Virtual Twins							
<i>Panelists: Saurabh Bahuguna, General Motors Corp., Phil Lechowicz, Ford Motor Co., Professor Hadi Meidani, University of Illinois, Victor Oancea and Chris Whiting, Dassault Systèmes and Moderator: Michelle Ash, Dassault Systèmes</i>							
3:30 PM							
Afternoon Break in Sponsor Exhibit Area and 3DEXPERIENCE Playground							
	SIMULIA Update I – GOLD	SIMULIA Update II – COPPER	SIMULIA Update III – SILVER	SIMULIA Update IV – BRONZE	SIMULIA Update V – AMETHYST	SIMULIA Update VI – EMERALD	SIMULIA Update VII – Coral
4:00 PM	SIMULIA R&D Abaqus Structures Technology Update <i>Ross Mclendon, Mikhail Belyi, Prashanth Vijalapura & Sandeep Kulathu, Dassault Systèmes</i>	Multibody System Dynamics Update <i>Armin Veitl, Dassault Systèmes</i>	Fluids Portfolio R&D Update (45 minutes) R&D Update on AI/ML for Fluids (45 minutes) <i>Nicolas Fougere, Dassault Systèmes</i>	Vibro-Acoustics Update <i>Phil Shorter, Dassault Systèmes</i>	Electromagnetic Technology Updates 2026 <i>Sebastian Kizewski, Scott Piper & Frank Scharf, Dassault Systèmes</i>	Modeling & Simulation R&D Updates, <i>Abelardo Garza & Christina Feist, Dassault Systèmes</i>	Session I: 3DEXPERIENCE Multiphysics 2026 <i>Victor Oancea, Dassault Systèmes</i>
4:30 PM							Session II: Integrating AI into Physics-Based Modeling: Hybrid, Reduced-Order, & Generative Approaches in Dymola <i>Jyothi Matam, Dassault Systèmes</i>
5:00 PM							
5:30 PM							
Reception in Sponsor Exhibit Area and 3DEXPERIENCE Playground							

Conference Agenda

Day 2 | Thursday, May 14, 2026

Register or learn more [here](#)

8:15 AM	Registration, Coffee & Breakfast in the Sponsor Exhibit Area and Women in Engineering Networking Breakfast in the 3DEXPERIENCE Playground						
9:15 AM	Welcome & Opening Remarks, Mark Bohm & Peer-Philipp Krambeer, Dassault Systèmes						
9:30 AM	Modeling & Simulation (+AI) – Enabling Transformation from Sequential to Concurrent Engineering, Ramji Kamakoti, Dassault Systèmes						
10:00 AM	Keynote Presentation: Why 3DEXPERIENCE Has Become a Transformative Experience for the Ford Chassis CAE Engineering Team, Satyendra Savanur, Ford Motor Co.						
10:30 AM	Morning Break in Sponsor Exhibit Area and 3DEXPERIENCE Playground						
11:00 AM	Electromagnetic Simulations: Enabling Critical Applications Across Industries, Frank Scharf, Dassault Systèmes						
11:30 AM	Keynote Presentation: Advancing Generative Design and Optimization with Modeling & Simulation, Jason Action, Lockheed Martin						
12:00 PM	SIMULIA Champions Welcome						
12:15 PM	Group Photo, Plated Lunch, Sponsor Exhibit Area & Playground Open – Sponsored by GoEngineer						
THANK YOU TO OUR GOLD & SILVER SPONSORS!							
	Track 1 – GOLD Sponsor Session	Track 2 – SILVER Sponsor Session	Track 3 – COPPER Sponsor Session	Track 4 – BRONZE Sponsor Session	Track 5 – AMETHYST Sponsor Session	Track 6 – EMERALD Sponsor Session	
1:30 PM	An Investigation into Multispecies Fluid Flow (free surface) Utilizing High Performance Computing and Cloud Solve <i>Robert Warren, GoEngineer</i>	Enabling Agile Design Reviews for Abaqus users: Transitioning from Static Reports to Interactive 3D Slides / Workflows <i>Prasad Mandava, VCollab</i>	Multiphysics of Oxidation and Fatigue in Elastomer Automotive Applications <i>William Mars, Endurica LLC</i>	A Concept Model for Voltage Drop Simulation in Wire Harness Crimping <i>Ankur Kumar, Tata Technologies</i>	TotalCAE HPC Technology Choices for Accelerating the SIMULIA Portfolio <i>Rod Mach, TotalCAE</i>	Load Reconstruction with Wolf Star Technologies' True-Load <i>Tim Hunter, Wolf Star Technologies</i>	
1:50 PM	Become a Simulation Olympian: The Analyst's Journey on the 3DEXPERIENCE platform <i>Benjamin Beckelynych, Technia</i>	Driving Customer Success with Abaqus and VIAS3D <i>Shawn Freeman, VIAS3D</i>	Automated Polymer Material Characterization for Abaqus Using VALIMAT®-AUTOFIT Workflow <i>Arjun Balagopal Menon, 4aEngineering GmbH</i>	Introducing Coreform IGA for Abaqus - Empowering Meshing-free Workflows for Abaqus Simulations <i>Gregory Vernon, Coreform</i>	Same Goals, Different Rules: FEA Automation Then and Now <i>Tom Feister, TriMech Solutions</i>		
Customer Technical Breakout Sessions							
	Track 1 – GOLD Structure I	Track 2 – SILVER Structures II	Track 3 – COPPER Vibro-Acoustics	Track 4 – BRONZE Electromagnetics	Track 5 – AMETHYST MODSIM	Track 6 – EMERALD Multidiscipline	Track 7 – CORAL Fluids
2:10 PM	Advanced Electronic Packaging System Level Modeling: PCB Voxelization and Submodeling <i>Shams Arifeen & Aiman Shibli, Google</i>	From Abaqus Simulation to Real-Time Structural Integrity Using Physics-Informed AI <i>Benedikt Engel, MatAlytics Ltd,</i>	Selection of Induction Motor Stator and Rotor Slot Number Combination for Optimal NVH <i>Jing Ba, Dauch, formerly AAM</i>	Efficient Gap Modeling in CST Studio Suite for Early Prediction of EMC Failures in Automotive Shielded Interconnects <i>Abbas Alwishah, Molex</i>	Computational Fluid Dynamics of Intracerebroventricular Delivery in NHP Ventricular Virtual Twins <i>Kevin Haddock, Biogen</i>	Predictive Simulation and Virtual Twin Framework for Material and Design Optimization in Comfort-Focused Products <i>Arindam Chakraborty, VIAS3D, on behalf of Purple Innovations</i>	Introduction and Execution of Advance Common Model at General Motors for PowerFLOW Simulations <i>Antonino Destasi & Brian Schroll, General Motors</i>
2:40 PM	Prismatic Cell Enclosure Analysis Using Ductile Damage Model <i>Arturo Sanchez & Alec Husemeier, General Motors</i>	Residual Strength of Notched Composite Test Coupons using Abaqus Mean Field Homogenization <i>Jonathan Lusk, Boeing</i>	Flight Test Reduction via Vibroacoustic Analysis <i>Gary Simpson, Lockheed Martin</i>	Non-Parametric Optimization to Reduce Electric Motor Noise <i>Song He, General Motors</i>	Medical Device Product Development – Ensuring Success amidst Uncertainty <i>Kyle Johnson, NeoCoil & Chris Schaefer, GSC</i>	MOBI-LAB: A Multibody-Driven Load Intelligence Framework for Vehicle Performance <i>Paul Lucas, Daimler Truck North America</i>	High-Fidelity Computational Approach to Study sUAS Aerodynamic Degradation in Rime Ice Conditions <i>Edwin Daniel, NIAR - Wichita State University</i>
3:10 PM	Afternoon Break in Sponsor Exhibit Area and 3DEXPERIENCE Playground						

Conference Agenda Day 2 Continued

Register or learn more [here](#)

	Track 1 – GOLD Structure I	Track 2 – SILVER Structures II	Track 3 – COPPER Vibro-Acoustics	Track 4 – BRONZE Electromagnetics	Track 5 – AMETHYST MODSIM	Track 6 – EMERALD Multidiscipline	Track 7 – CORAL Fluids
3:40 PM	Progressive Failure Simulation of Both Polymer- and Ceramic-Matrix Composites Performed Using Abaqus <i>Dr. Jim Roach, RTX – Pratt & Whitney</i>	Automating Results Extraction for Families of Products <i>Henry Hohnacki, Engineering Strategies</i>	Using wave6 AI/ML Algorithms to Automate Detection and Localization of Squeak and Rattle Events in Vehicle Cabins <i>Wenlong Yang, General Motors</i>	Investigation of Electromagnetic Emissions from Automotive DC-DC Converters <i>Matthew Gee, Robert Bosch</i>	Differences in Transverse Shear Plate Stiffness Formulations in Commercial FEM Solvers: Theory and Composite Wing Applications <i>Olaf Weckner, Boeing</i>	Optimization Process Applied to Agricultural Tires <i>Victor Messias, Titan Tire & Thomas Schlitt, GoEngineer</i>	Flow Driven Generative Design and Parametric Optimization Case Studies <i>Prashanth (Pat) Pai, Ford Motor Co.</i>
4:10 PM	Motor Laminate Stack Interlocking & Dismantle Simulation <i>Marcus Chen, General Motors</i>	Nonlocal Drucker-Prager Plasticity: A VUMAT Implementation, Verification, and Application <i>Timmy Ngo, Purdue University</i>	Adding Vibro-Acoustic Detail to Interior Windnoise Models by Combining wave6 with PowerFLOW <i>Ricardo De Alba Alvarez, Ford Motor Co.</i>	Compact High-Performance Circularly Polarized Dish Feed for 1296 MHz <i>Bill Siino, Curious Communications & Clint Patton, GoEngineer</i>	Ultra-Optimized Packaging Design <i>Brad Philip, Amcor Rigid Packaging</i>	FEA Approach for Equivalent Static Modes <i>Tim Hunter, Wolf Star Technologies</i>	Computational Framework for Designing and Testing Novel Open Rotors Propeller <i>Barry Lim, Wichita State University - NIAR</i>
4:40 PM	Rotordynamics Design Analysis of a High-Speed Composite Flywheel: Key Challenges & Solutions <i>Joshua Gorfain, Quartus Engineering</i>	Predictive Analysis and Simulation-driven Design for Structural Sealant Glazing Under Seismic Loading <i>Hang Shu, The Dow Chemical Company</i>	Simulation of Multi-Zone Direct Field Acoustic Noise (DFAN) Test of Orion Spacecraft Using wave6 <i>Dr. Indranil Dandoroy, Dassault Systèmes on behalf of Lockheed Martin</i>		Topology Optimization for Lightweight Aerospace Structures in 3DEXPERIENCE <i>Andy Shabazian, Iliad Innovations – supporting U.S. Air Force-aligned programs</i>	Non-Pneumatic Tire Design and Validation <i>Thomas Feister, TriMech Solutions on behalf of A3T LLC</i>	PowerINSIGHT VR Enabling Real Time Collaboration for Flow Field Understanding <i>Fernando Saito, General Motors</i>
5:10 PM	Evening Reception in Sponsor Exhibit Area and 3DEXPERIENCE Playground						

Abstracts Submitted for the 2026 SIMULIA Americas Users Conference

This document contains the abstracts submitted for the SIMULIA Americas Users Conference, held in Novi, MI, on May 13-14, 2026. We thank the authors for their efforts in preparing these presentations.

Plenary & Keynote Presentations

Why 3DEXPERIENCE Has Become a Transformative Experience for the Ford Chassis CAE Engineering Team

Satyendra Savanur, People Leader Underbody Systems Engineering, Ford Motor Co.

Ford Motor Co. aims to implement a true digital twin throughout its product lifecycle by using the 3DEXPERIENCE platform's ecosystem. This initiative includes the successful application of the 3DEXPERIENCE platform by Ford's Underbody Systems Team, who have adopted the MODSIM philosophy as part of their journey toward building a digital twin. The Underbody Systems team transitioned from siloed, standalone tools to an integrated 3DEXPERIENCE platform to streamline their simulation engineering workflows. By adopting the Model-Scenario-Result (MSR) Unified Object-Based Data Model, the team established a seamless link between native parametric geometry and simulation models. This integration eliminated the administrative burden of manual file management across disparate storage locations, enabling more expansive design space exploration. Consequently, the unified modeling and simulation approach facilitated advanced Design of Experiments (DOE) and data analytics at every stage of the product development lifecycle. The 3DEXPERIENCE platform enhances Digital Twin management by fostering collaborative workflows, which in turn streamlines production cycles and reduces human errors through a unified data environment.

Advancing Generative Design and Optimization with MODSIM

Jason Action, Aeronautical Engineer Senior Staff, Lockheed Martin

Lockheed Martin's Advanced Development Programs (ADP) continuously push the frontier of digital engineering to meet today's defense challenges. The ADP StarDrive initiative re-imagines the product lifecycle from concept through fleet sustainment with several projects focusing on the digital engineering processes in every phase. Project Gamma, one of the StarDrive projects, leverages Dassault Systèmes 3DEXPERIENCE and the MODSIM methodology to create a digital-engineering environment while performing optimization and generative design activities. This MODSIM approach transforms sequential workflows into an iterative, data-driven process that enables an optimal configuration by integrating critical design and analysis requirements directly into the generative design loop. Collaborative engagements with Dassault Systèmes have deepened the expertise in the 3DEXPERIENCE MODSIM framework, progressing towards a robust coupling of simulation and design methods as part of an overall workflow. This presentation will highlight specific case studies demonstrating performance gains, weight reductions, multi-discipline team communications, lessons learned in scaling generative design across large-scale aerospace platforms.

Learning the Physical World: Neural Models for Simulation, and Design,

Hadi Meidani, Associate Professor, University of Illinois at Urbana-Champaign

Advances in machine learning are transforming how we model and design engineered systems. This presentation discusses recent developments in physics-based neural networks and neural operators for fast, accurate physics-based simulation. We will show how these approaches can lead to a foundation modeling framework with generalization across geometries, boundary conditions and physical properties. Using several 3D industry-scale examples, we show how integrating neural network surrogates and generative models can lead to intelligent digital systems that revolutionize industrial design.

Customer Presentations

Ultra-Optimized Packaging Design

Thomas Feister, Technical Manager, Structures, TriMech Solutions on behalf of A3T LLC

TriMech and A3T LLC, the US Research and Development arm of Triangle Tyre Group, collaborated to simulate a next-generation non-pneumatic tire (NPT) using Dassault Systèmes' 3DEXPERIENCE platform. The tire incorporates a set of novel structural and material design features that have not previously been implemented in NPT architectures, presenting unique modeling and simulation challenges. Accurate representation of the complex geometry, heterogeneous material behavior, and load-bearing mechanisms required advanced FEA capabilities beyond conventional workflows. 3DEXPERIENCE SIMULIA Simulation functionality was critical in enabling robust meshing strategies for intricate internal features, precise definition of nonlinear material properties, and reliable modeling of mechanical connections between tire components. The integrated simulation environment supported efficient iteration and refinement of the design while maintaining solution stability and fidelity. The resulting analyses provided insight into structural response, load distribution, and deformation behavior under representative operating conditions. This work demonstrates the value of advanced FEA tools in supporting innovative non-pneumatic tire development and highlights the role of simulation in accelerating the evaluation of unconventional tire designs.

Non-Pneumatic Tire Design and Validation

Brad Philip, Principal Engineer, Amcor Rigid Packaging

In this work, we demonstrate a cutting-edge approach to sustainable packaging development by leveraging advanced design-space exploration and multi-physics optimization within the SIMULIA platform. Our parametric packaging architecture enables the generation and evaluation of millions of geometric variants, creating an expansive design landscape that would be impossible to investigate through traditional engineering workflows. Using the platform's built-in optimization engine, we simultaneously assess multiple critical performance criteria — most notably vacuum response and top-load resistance — within a unified computational framework. This concurrent evaluation of competing physics behaviors allows the system to identify high-performing, material-efficient designs that balance structural integrity with stringent sustainability requirements. Instead of relying on sequential iterations or heuristic judgment, the optimizer autonomously navigates the trade-space, discovering configurations that push beyond conventional engineering intuition. By combining large-scale parametric modeling, automated meshing, and parallelized simulation, the methodology accelerates development timelines while drastically reducing the environmental and resource costs associated with physical prototyping. The result is a data-driven pipeline that not only highlights optimal solutions but reveals novel design directions that improve recyclability, reduce resin usage, and increase package performance.

Residual Strength of Notched Composite Test Coupons using Abaqus Mean Field Homogenization

Jonathan Lusk, Senior Lead, ATF, The Boeing Company

Abaqus Mean Field Homogenization (MFH) was used to predict the damage growth and residual strength of notch composite test coupons: compact tension, center notch tension, and center notch compression. This work covers the determination of constituent-based property derivation from a public material database and the use of MFH to predict damage onset. Subsequently, damage evolution using instantaneous stiffness degradation was used to characterize damage growth and predict residual strength. MFH shows promising results in predicting the residual strength when compared to publicly available notched composite test coupons. This work is a precursor in developing a method to simulate damage growth and predict the residual strength response when scaling up to configured airframe structure.

Differences in Transverse Shear Plate Stiffness Formulations in Commercial FEM Solvers: Theory and Composite Wing Applications

Olaf Weckner, Technical Fellow, The Boeing Company

When calculating the deformation of thin composite structures such as the 787 fuselage the standard Boeing and industry approach is to use computationally efficient 2D plate approximations, in particular the first order shear deformable plate theory, aka REISSNER-MINDLIN plate theory, implemented e.g. in Abaqus' S4 element or

MSC Nastran's QUAD4 element. Transverse shear is typically a second order effect for solid laminates. However, depending on the loading, geometry and material (e.g. sandwich structure) the effect becomes larger and the stability analysis could be unconservative without accounting for transverse shear. While the industry agrees how to calculate the in-plane (A), bending (D) and coupling (B) stiffnesses using Classical Laminate Plate Theory (CLPT), that is not the case for the 2x2 transverse shear stiffness matrix. Various shear correction factors are proposed in the literature for metals, depending on the type of analysis (static vs dynamic) and also the Poisson ratio. For composites the situation is worse: even for a relatively simple symmetric laminates the transverse shear stiffness in Abaqus, MSC Nastran and Boeing can differ significantly. In this talk, we present the differences observed in the transverse shear stiffnesses used for composite plate analysis both within commercial FEM solvers such as Abaqus and MSC Nastran and well as in-house Boeing computational tools. We demonstrate the effect of these differences on sizing of composite structures under stability and deflection constraints.

Compact High-Performance Circularly Polarized Dish Feed for 1296 Mhz

Bill Siino, President & CEO, Curious Communications, Clint Patton, Senior Application Engineer-Electromagnetic, GoEngineer

A new compact high-performance circularly polarized dish feed has been developed with the help of CST MWS. The feed is designed to be used within a parabolic dish for Earth-Moon-Earth (EME) communications at 1296 Mhz. The feed uses a square patch with perturbations that's excited with tapered probes through a square loop aperture. The probes, aperture and patch are printed on circuit boards. Both S11 and S12 are near -20 dB with Axial Ratio < 3 dB.

MOBI-LAB: A Multibody-Driven Load Intelligence Framework Vehicle Performance

Paul Lucas, Associate Principal Engineer, Daimler Truck Company

Modern durability workflows rely heavily on multibody simulation (MBS) to generate load time histories; however, the scale and variability of these datasets present a significant challenge for interpretation, reduction, and reuse. MOBI-LAB (Multibody Operational Behavior & Integration Lab) addresses this gap by establishing a structured, data-driven framework that transforms raw multibody simulation outputs into actionable load intelligence. At its foundation, MOBI-LAB integrates multibody-generated load histories across multiple vehicle configurations, duty cycles, and operating conditions into a unified database. Rather than treating each simulation as an isolated result, the framework organizes loads by subsystem, channel, and configuration, enabling direct comparison across a fleet of vehicles. This multibody-centric approach preserves the physical fidelity of system-level dynamics while creating a consistent structure for downstream analysis. Advanced signal processing and feature extraction techniques are applied to the MBS outputs, including time-domain statistics, frequency-domain representations, and fatigue-relevant metrics derived from load histories. These features are then used in dimensionality reduction and clustering workflows (e.g., PCA and k-means) to identify dominant load behaviors, group similar operating conditions, and quantify variability across the dataset. The result is a scalable methodology for reducing thousands of multibody simulations into a manageable set of representative load cases. These cases can be propagated to finite element and fatigue analyses, enabling more efficient and statistically grounded durability assessments. Additionally, the framework supports the integration of machine learning models to predict load characteristics based on vehicle configuration, further enhancing early-stage design capability. MOBI-LAB demonstrates how multibody simulation can evolve from a load generation tool into a central pillar of a data-driven durability ecosystem, enabling faster decision-making, improved correlation across programs, and a systematic approach to load case development in modern CAE workflows.

Simulation of Multi-Zone Direct Field Acoustic Noise (DFAN) Test of Orion Spacecraft Using wave6

Indranil Dandaroy SIMULIA Industry Process Consulting Director – Vibro-Acoustics & Shock (wave6), Dassault Systèmes on behalf of Lockheed Martin

Historically, ground development and verification testing of space hardware has been conducted in acoustic reverberation chambers which, because of limited test location availability, can delay schedules and increase program costs. A more cost- and time-effective approach is to conduct Direct Field Acoustic Noise (DFAN) tests. DFAN test implements portable speaker systems at desired locations to offer better control of the acoustic driving environment. Previously, DFAN tests applied a single reference environment to excite space hardware.

This posed a challenge to verifying NASA's Artemis deep space Orion Crew and Service modules, as the respective modules experience different sound pressure level (SPL) spectra. A novel approach to addressing this problem leveraged pre-test acoustic analysis with wave6® software to configure partially-coherent speaker groups capable of exciting the modules to distinct SPLs without adversely driving other regions. High-fidelity wave6 pre-test predictions of a two-zone acoustic environment compared well with test measurements across multiple reference levels, indicating viability of this approach for future ground testing. These improvements allow for multi-zone testing that enable the reduction of program costs, expedited schedules, and minimization of post-qualification work. Likewise, the strong model-test correlation provides confidence in the combination of wave6 analysis techniques with the DFAN test methodology, strengthening pre-test predictions and lowering test risk.

Predictive Analysis and Simulation-Driven Design for Structural Sealant Glazing Under Seismic Loading

Hang Shu, Senior Research Specialist, Dow Chemical

This work presents an integrated experimental–computational framework to evaluate the seismic performance of Structural Sealant Glazing (SSG) systems and to advance predictive capabilities at both material and assembly levels. High fidelity constitutive models were developed for DOWSIL™ silicone sealants, capturing hyperelasticity, viscoelasticity, and Mullins softening behaviors. Model development combined uniaxial tensile and cyclic loading experiments on coupon specimens with parameter calibration using Abaqus/CAE, Isight, and physics informed neural networks (PINNs). Model validation was achieved via comparison with cyclic lap shear experiments, demonstrating strong agreement in reproducing stress concentrations, strain localization, and damage related softening under repeated loading. Building on the validated material models, the methodology was extended to full scale virtual prototyping of frame–sealant–glass assemblies subjected to seismic loading. A systematic design of experiments (DOE) quantifies the influence of key geometric and material parameters on critical structural responses. Together, this material to system workflow illustrates the value of advanced simulation in reducing reliance on costly, large scale physical testing, while enabling fast-to-market products.

Automating Results Extraction for Families of Products

Henry Hojnacki, Independent Consultant, Engineering Strategies

Often in the course of doing simulation, particularly in dedicated industries, we find ourselves doing repetitive tasks. We simulate families of products, using standardized load cases, and review the same set of results for very similar products. Considerable time savings can be achieved by standardizing modeling techniques, and automating extraction of results. Abaqus provides a robust set of tools for accomplishing this with Abaqus Python. In this presentation, we provide methodology and guidance for standardizing simulation by:

- Standard naming conventions for loads, node sets, surfaces, and contacts.
- Standardizing result plots and tables
- Automating extraction of results
- Automated report generation

We show how Abaqus Python can be used for a family of products to achieve a high level of automation.

Adding Detail to Interior Windnoise Models Using Wave6 with PowerFLOW

Ricardo De Alba Alvarez, Technical Specialist, Ford Motor Co.

Interior noise in vehicles affects passenger comfort and perceived quality. At higher vehicle speeds windnoise is often one of the dominant contributors to interior noise. In order to model interior windnoise it is necessary to describe both the unsteady pressure fluctuations on the exterior of the vehicle along with the transmission paths to the vehicle interior. The level of detail that is required to describe the paths can be application dependent. For many paths it is possible to use the templated models in PowerACOUSTICS together with PowerFLOW in order to describe transmission. Such models are often well suited for quick predictions and when limited information is available about certain paths. However, in some instances it is useful to create more detailed models by using wave6 together with PowerFLOW. This paper discusses work carried out by Ford and Dassault Systèmes to look at ways to add more detail to certain paths. Various examples will be discussed including path contributions through a stiff quarter glass, diagnosing transmission paths through door and glass seals using wave6 network diagrams and the influence of local interior A and B pillar geometry on interior noise.

Flow Driven Generative Design and Parametric Optimization Case Studies

Prashanth (Pat) Pai, Technical Specialist Air Registers, Ford Motor Co.

In modern vehicle engineering, HVAC component development is a critical lever for maximizing aerodynamic efficiency and minimizing energy losses. As interior architectures become more complex, the ability to optimize airflow delivery is no longer just a functional requirement but a primary driver of occupant comfort and vehicle performance. Traditional development cycles are frequently hindered by a "geometry-first" approach, where Computational Fluid Dynamics (CFD) validation occurs too late in the process. This reactive workflow creates significant bottlenecks, forcing engineers into costly, late-stage adjustments to address recirculation zones, acoustic noise, or airflow obstructions—such as steering wheel interference—that were not identified during initial design. This study proposes a "physics-first" methodology that integrates flow-driven generative design directly into the agile development cycle. By leveraging a unified PLM system to bridge the gap between CAD and CFD, the research demonstrates three key advancements:

- **Case 1: Generative Design:** Proactive elimination of recirculation and noise through optimized duct routing
- **Case 2: Parametric Optimization:** Use of parametric automation to solve complex register-aiming challenges caused by steering wheel obstructions
- **Case 3: Flow Analysis:** Removal of data transfer bottlenecks through a seamless, single-platform simulation workflow

Implementation of this simulation-led framework resulted in a reduction in design lead time and a reduction in material usage in the duct. By shifting the engineering focus from validation to generation, this methodology ensures a superior performance baseline while significantly reducing the reliance on late-stage changes or compromises.

CFD Model Build Process Enhancements Using ACMB

Brian Schroll, Senior Aerodynamics Engineer & Antonino Destasi, Aerodynamics Engineer, General Motors Corp.

The automotive industry continuously explores, evolves, and adopts new processes for vehicle development while refining established methods to reduce turnaround time through automation. Among these tools, PowerFLOW has become a cornerstone for aerodynamic analysis, widely used by General Motors' CAE Fluids team to evaluate the aerodynamic performance of vehicles in development. To further enhance the efficiency of traditional PowerFLOW workflows, General Motors has collaborated with SIMULIA to adopt the Advanced Common Model (ACM) methodology. This presentation highlights the outcomes of this collaboration, detailing its implementation and impact. Specifically, we will demonstrate the adoption and customization of the Advanced Common Model Build (ACMB) process to meet General Motors' unique requirements. As a critical component of the broader ACM workflow, ACMB identification automates every stage of PowerFLOW simulations — from CAD preparation to results generation. To illustrate its capabilities, we will showcase a live example using the Cadillac Lyriq, demonstrating how the ACM approach delivers serious automation benefits to General Motors' PowerFLOW workflows.

Motor Laminate Stack Interlocking & Dismantle Simulation

Marcus Chen, CAE Technical Specialist - Motor Structures, Cranktrain, and Dynamics, General Motors Corp.

Interlocking is a primary laminate stacking method in electric motor construction. This study utilizes Abaqus to simulate the interlocking and dismantling of rotor stacks to ensure sufficient bonding strength and optimize tooling design. The simulation results show excellent correlation with hardware test data, demonstrating high fidelity in capturing the physical mechanics of the assembly. This virtual assessment provides a reliable method for the design and validation of laminate interlocks, reducing the need for iterative physical prototyping.

Non-Parametric Optimization to Reduce Electric Motor Noise

Song He, NVH Technical Specialist, General Motors Corp.

Electric motor is among the main sources of noise and vibration for electrified propulsion systems. This presentation focuses on non-parametric optimization to reduce the noise for an 8-pole 96-slot permanent magnet motor while meeting motor torque and structural requirements. First, topology optimization is

performed including coupled EM and structural analyses that leads to new rotor lamination design with reduced torque harmonics. Shape optimization is then conducted to refine the topology design within EM and structural constraints, leading to further reduction in motor noise. Non-parametric optimization creates unique design topology features that may not be captured by conventional parametric optimization methods.

Power In Sight VR Enabling Real Time Collaboration for Flow Field Understanding

Fernando Saito, Aerodynamics Engineer, General Motors Corp.

Aerodynamics has become a critical focus area for modern vehicle development, particularly for electric vehicles, where aerodynamic performance can account for an estimated 30% to 40% of overall driving range. This importance is accelerating a shift away from development processes centered on physical wind-tunnel testing toward workflows built on advanced virtual tools. Traditionally, aerodynamicists and designers collaborated in the wind tunnel, iterating vehicle surfaces in real time to balance drag reduction with styling intent. While effective, this hands-on approach was constrained by physical hardware, limited flow visualization, and the need for all stakeholders to be co-located. Today, high-fidelity virtual aerodynamic development tools enable detailed simulation and visualization of flow behavior from concept through production. Engineers can access essentially unlimited flow visualization, including complex unsteady features and underbody structures that are difficult or impossible to observe in physical tests. This virtual workflow streamlines development, expands diagnostic capability, and creates new opportunities for cross-functional collaboration. A key innovation in this space is the integration of virtual reality (VR) into the aerodynamic development process. Immersive VR environments allow engineers and designers to experience flow fields in true three dimensions, revealing flow structures and interactions that may be overlooked in conventional 2D visualizations. Complex phenomena such as unsteady wakes, stagnation regions, and underbody flow features can be explored more intuitively, supporting faster root-cause identification and more targeted surface modifications. VR also enables real-time, multi-user collaboration across locations: participants can join the same virtual review, interact with the same flow solution, annotate regions of interest, and observe changes to geometry and flow responses together. During a VR review, teams can visually assess aerodynamic performance and directly connect “what they see” in the flow field to “what they change” on the surface. Users can follow the viewpoint of a lead reviewer, which improves communication, reduces the learning curve for those new to VR navigation, and ensures that all participants share a common visual reference. In this context, SIMULIA has developed VR software in conjunction with GM to support product development reviews, enabling multiple users to access and interrogate the same flow solution simultaneously. By combining this capability with other virtual development tools, the approach improves the efficiency and quality of aerodynamic decision-making while fostering a more innovative, collaborative culture for future mobility development.

Prismatic Cell Enclosure Analysis Using Ductile Damage Model

Arturo Sanchez, Lead VDDV Engineer, General Motors Corp.

Prismatic lithium-ion cell enclosures are critical to electric vehicle safety and performance, yet their structural behavior is often characterized primarily through empirical testing rather than predictive engineering metrics. This presentation describes General Motors’ effort to develop a physics-based understanding of prismatic cell can integrity to enable quantified safety factors and controlled, fail-safe designs. Advanced FEA models were developed incorporating ductile damage mechanics with stress triaxiality-dependent failure criteria, temperature-dependent material properties, and realistic thickness mappings derived from manufacturing simulations. Correlation with experimental results shows strong agreement in deformation and failure prediction under abuse load cases. This integrated simulation framework enables more accurate quantification of enclosure damage, improved safety margins, and informed design trade-offs between mass, energy density, and safety for prismatic lithium-ion cells.

Authors: Arturo Sanchez, Saurabh Bahuguna, Alec Husemeier, Faisal Sayeed

Using Wave6 AI/ML Algorithms to Automate Detection and Localization of Squeak and Rattle Events in Vehicle Cabins

Wenlong Yang, Technical Lead, General Motors Corp.

The initial quality perception of new vehicles is often influenced by the presence of Squeak and Rattle (S&R) events. S&R testing is therefore commonly performed by automotive OEMs and suppliers to detect issues during

vehicle development. A typical test process involves having a trained listener sit in a vehicle to acoustically detect, locate and subjectively rate S&R events during road or four poster testing. The recent development of new AI/ML algorithms in wave6 for acoustic event detection opens up new possibilities for automating some of this process. This paper describes collaborative work carried out by GM and Dassault Systèmes that uses AI/ML algorithms in wave6 to detect, label and locate S&R events in binaural recordings from vehicle testing. The AI/ML algorithms are trained on synthetic binaural soundscapes generated in wave6 using measured S&R sounds placed at various locations within a simulated vehicle cabin. Once trained, the wave6 AI/ML algorithm can detect the S&R events, classify them and predict expected source locations with high accuracy. This presentation summarizes some of the work and provides various examples.

Authors: Chong Wang, Qijun Zhang, Wenlong Yang, General Motors; Phil Shorter, Shoken Kaneko, Dassault Systèmes

Advanced Electronic Packaging System Level Modeling: Testing and Simulation

Shams Areifeen, Electronic Packaging Technical Lead & Aiman Shibli, Lead Structural Engineer, Google

Electronic chip packages and underlying PCBs are very complex structures with multiple layers and components. Running simulations on full scale detailed models of these structures is very difficult (if not impossible), yet understanding their failure modes and behavior under different reliability scenarios is crucial to any design. In this work, we propose an approach that is based on combining PCB voxelization with submodeling techniques to address detailed areas of interest, while leveraging legacy data from previous run-on full scale homogenized models.

Flight Test Reduction via Vibroacoustic Analysis

Gary Simpson, Senior Fellow, Lockheed Martin

This presentation demonstrates the ability to accurately predict vibroacoustic behavior of weapons under various captive carriage states in a typical flight envelope. Weapon fielding requires extensive flight testing, which is constrained by accurate instrumented measurement vehicles (IMV), availability of test aircraft, and competing test schedules with other weapons systems. Such tests rarely occur until the design is mature, leading to untimely and poorly defined environmental design requirements. In this presentation, an overview of the application of a highly efficient loosely coupled vibroacoustic analysis method is conducted with Wave6, where a Lattice Boltzmann Method computational fluid dynamics (CFD) code (PowerFLOW) is used to derive fluctuating surface pressures (FSP) that are applied to a structural modal model of the aircraft and attached weapon. Comparisons of the simulated sound pressure level (SPL) and acceleration responses at specific points are presented in comparison to their test measured equivalents. The results demonstrate a practical and accurate means of deriving captive carriage vibroacoustic environments that can be correlated to a reduced set of flight points, when appropriate modeling approaches are incorporated. These methods could enable a reduction in the amount of flight testing that must be accomplished and pull relevant environments to the front of the product life cycle. The efficiency of solve presents a capability that easily outpaces the time to execute a typical flight campaign, at a fraction of the cost. Further, it can be conducted at any time, without the constraints of the availability of a test aircraft or an IMV.

From Abaqus Simulation to Real-Time Structural Integrity Using Physics-Informed AI

Benedikt Engel, CEO, MatAlytics Ltd.

Across industries such as power generation, oil & gas, and heavy manufacturing, the integrity of high-value assets depends on accurately predicting stresses and material degradation under complex thermo-mechanical loading. Finite element analysis performed in Abaqus is the established gold standard for this task, enabling detailed evaluation of stress, strain, fatigue, and creep damage. However, despite its accuracy, conventional FE analysis is computationally expensive, time-consuming, and requires specialist expertise, limiting its use to offline studies and preventing real-time application during operation. This presentation introduces CITRUS, a physics-informed AI framework that extends the value of Abaqus beyond offline simulation into real-time structural integrity assessment. High-fidelity training datasets are generated entirely using Abaqus, covering representative component geometries, material models, boundary conditions, and operating envelopes. These simulations produce full-field stress, temperature, and damage responses that form a rigorously validated physics foundation. CITRUS leverages these Abaqus datasets to train physics-informed graph neural networks,

ensuring predictions remain grounded in first-principles mechanics rather than purely data-driven correlations. Once trained, the model ingests live operational inputs, such as temperature and pressure histories, and instantaneously reconstructs stress states and fatigue and creep damage accumulation. Predicted results show agreement exceeding 98% compared to equivalent Abaqus analyses, while reducing evaluation times from hours to milliseconds.

Efficient Gap Modeling in CST Studio Suite for Early Prediction of EMC Failures in Automotive Shielded Interconnects

Safal Sharma, Regional Technical Lead (Asia), EMC AND SI & Abbas Alwishah, Senior Engineering Manager, Molex

Shielded interconnects are a key element of electromagnetic compatibility (EMC) control in automotive electronic systems. Practical implementations involving connectors, braid terminations, and shield overlaps inevitably introduce microscopic gaps because of assembly forces, tolerances, and mechanical deformation. Although these gaps are typically only a few micrometers wide, they often dominate electromagnetic leakage paths and represent a common root cause of late-stage EMC test failures. Accurately predicting their impact using full-wave simulation is challenging, as direct modeling of such small and spatially varying gaps leads to excessive meshing requirements and long simulation times, limiting the usefulness of simulation for early design decisions. This presentation presents an efficient simulation methodology implemented in CST Studio Suite for early prediction of gap-induced EMC failures in automotive shielded interconnects. Structural simulation results are used to extract the spatial distribution of gap widths occurring at shield overlaps, connector interfaces, and braid termination regions. In the electromagnetic model, the physical micron-scale gaps are replaced by enlarged gap regions with constant thickness that can be meshed efficiently. The electromagnetic behavior of the original gaps is preserved by assigning spatially dependent material properties such that the capacitance per unit area remains unchanged and the propagation velocity of TEM modes in the gap equals the speed of light. The approach is validated by comparing insertion loss and field distributions for different gap widths and modeling strategies over a wide frequency range. Results show that the method reliably predicts shielding degradation and coupling mechanisms relevant to automotive EMC testing. The presented workflow enables identification of EMC-critical interconnect features early in development, reduces late design changes, and supports faster time-to-market with improved EMC robustness.

Medical Device Product Development – Ensuring Success Amidst Uncertainty

Kyle Johnson, Lead Mechanical Engineer, NeoCoil & Christopher Schaefer, Simulation Product Manager, GSC-3D

Medical device manufacturers face challenges across many aspects of a product's life cycle. Lower manufacturing volumes, stringent regulatory requirements, and complex designs and materials demand greater insight earlier on in the product development process. Learn how NeoCoil, a manufacturer of medical imaging products, takes advantage of early digital testing and validation to gain confidence and reduce physical prototypes before product launch.

1. The virtual validation landscapes
 - In-CAD vs. 3DExperience platform options
 - Types of physics problems tackled
2. Where virtual validation fits into the NeoCoil NPD (new product development) lifecycle
 - Regulatory approval
 - Challenges with material selection
3. Use cases
 - Structural validation of a ____ coil for ____ requirement
 - Drop test validation of a ____ coil for ____ requirement
 - Durability validation of a ____ coil for ____ requirement

Nonlocal Drucker-Prager Plasticity: A VUMAT Implementation, Verification and Application

Timmy Ngo, Research Assistant, Purdue University

Strain localization in finite elements remains a persistent challenge, leading to mesh-dependent solutions. This work introduces two primary contributions to address these issues. First, we present a novel nonlocal Drucker-

Prager plasticity model developed for three-dimensional solid continuum elements. The Coupled Eulerian-Lagrangian (CEL) framework is employed for modeling granular continua. By incorporating a material length scale, the model regularizes the constitutive law, effectively mitigating spurious mesh-dependent softening. To our knowledge, this is the first implementation of a nonlocal Drucker-Prager model for CEL continua. Second, the model is implemented as a Vectorized User MATerial (VUMAT) subroutine whose local formulation is verified to be both robust and accurate with a near one-to-one correspondence with the native Abaqus Extended Drucker-Prager model, and a verification benchmark not previously documented in the literature. Mesh-refinement studies further demonstrate that the extended nonlocal model yields mesh-independent solutions, leading to physically meaningful results.

Rotordynamics Design Analysis of a High-Speed Composite Flywheel: Key Challenges & Solutions

Joshua Gorfain, Senior Engineering Manager, Quartus Engineering

Novel fiber-reinforced composite materials enable the potential for high performance flywheel energy storage systems. Designing flywheel components capable of realizing this potential is a challenge that heavily relies on simulation driven design. The work presents the Abaqus finite element analysis (FEA) techniques used to successfully design a flywheel assembly capable of operating at more than 35,000 rpm. Strength and compliance behaviors had to be balanced under the rotational inertial loads. This was accomplished by applying a multilevel design optimization approach using the Tosca framework. Rotordynamic analyses of the optimized system were then conducted to determine critical speeds of the system so performance problems associated with these resonances could be avoided when subsequent spin testing is performed.

Progressive Failure Simulation of Both Polymer- and Ceramic-Matrix Composites Performed Using Abaqus

Jim Roach, CMCAT Structures and Methods Discipline Associate Director, RTX – Pratt & Whitney

A robust method of predicting progressive failure in both polymer- and ceramic-matrix composites (PMCs and CMCs, respectively) was pursued. PMCs and CMCs are substantively different in their manufacture and structural response; however, they possess several similarities relative to how they are evaluated analytically. Laminated unidirectional and woven specimens were evaluated at both macroscale and mesoscale levels using the Smearred Crack Approach (SCA) executed using Abaqus v2024. Simulation results compared with experimental data from both PMC angled coupons and CMC Single Edge Notched tensile specimens are presented. Work to date illustrates that SCA may be used within a composite simulation to explore both inter-laminar (through-thickness) and intra-laminar ("in-plane") progressive damage at both macroscale and mesoscale levels, demonstrating SCA as a viable technique for simulating progressive damage in composite parts.

Predictive Simulation and Virtual Twin Framework for Material and Design Optimization in Comfort-Focused Products

Arindam Chakraborty, Director of Strategic Consulting, VIAS3D on behalf of Purple Innovation LLC

Predictive simulation is increasingly applied in the development of comfort-focused products, where achieving an appropriate balance between firmness and pressure relief is critical. This presentation introduces a SIMULIA Abaqus-based virtual twin framework that integrates material calibration, design optimization, and structural stability analysis to support new product development. The workflow combines hyperelastic material calibration with geometry-driven design exploration to enable efficient evaluation of comfort-related performance drivers. Ogden and Mooney-Rivlin constitutive models are calibrated using uniaxial, biaxial, volumetric and shear test data to represent nonlinear and near-incompressible material behavior. The calibrated models are incorporated into a parametric simulation framework to assess the influence of material formulation and design changes under representative loading conditions. Buckling and post-buckling simulations are included to capture deformation modes that contribute to perceived firmness and pressure redistribution. Because of confidentiality constraints, specific simulation results are not presented. The proposed methodology demonstrates a scalable predictive simulation approach that supports informed material and design decisions while reducing reliance on physical prototyping in comfort-driven product development.

Investigation of Electromagnetic Emissions from Automotive DC-DC Converters

Matthew Gee, Hardware Engineer, Robert Bosch LLC

DC-DC buck converters are widely used in modern automotive electronics because of their high efficiency and compact size. However, the fast-switching voltages and currents inherent to these converters make them a significant source of electromagnetic interference (EMI). With the growing complexity of modern automotive systems, managing unintended electromagnetic coupling has become a critical EMC challenge. This presentation investigates electromagnetic emission associated with automotive DC-DC power converters. The study analyzes emission measurements with computational electromagnetic simulations to identify dominant EMI sources. Using CST Studio Suite, the influence of switching behavior, PCB layout and near-field emissions on overall radiated performance is analyzed and correlated with measurements. Effective mitigation strategies are evaluated, demonstrating significant improvements in radiated emission performance through targeted shielding and layout optimization.

Optimization Process Applied to Agricultural Tires

Victor Messias, R&D Engineer, Titan Tire, Thomas Schlitt, Senior Specialist, Simulation, GoEngineer

This study investigates the influence of geometric parameters on the performance of agricultural tires for very low-pressure (VF) and high-torque applications. Using the 3DEXperience Optimization Process Composer, the challenges of modeling multiple large deformations and complex tire geometries were surpassed, while focusing on one of the largest agricultural tires currently in production, keeping a lean element distribution strategy to avoid compromise in simulation performance using the 3DEXperience platform native apps. A key outcome was the development of a design of experiments framework that offers insights for both manufacturing and R&D teams, enabling more efficient tire development and performance tuning.

Computational Framework for Designing and Testing Novel Open Rotors Propeller

Barry Lim, Research Engineer, Wichita State University - NIAR

Propeller driven aircraft and drones face growing challenges related to noise emissions as regulations tighten and public concern over acoustic pollution increases. Propeller noise arises from mechanisms such as blade-vortex interaction, loading and thickness noise, and turbulence ingestion, all of which are highly sensitive to blade geometry and operating conditions. Effective noise reduction strategies must address both noise intensity and frequency content, as humans are particularly sensitive to tonal noise between 500 and 4000 Hz. Levels below 70 dBA are generally considered acceptable. This study investigates noise reduction strategies using biomimetic design features inspired by birds and marine animals. Elements such as serrated trailing edges and textured surfaces can disrupt vortex structures and reduce tonal noise at lower frequencies without compromising aerodynamic performance. High-fidelity simulations are performed using PowerFLOW, a Lattice Boltzmann based CFD solver capable of capturing transient unsteady flow and high frequency aeroacoustics sources because of its low numerical dissipation. The biomimetic propeller concepts are manufactured using additive manufacturing methods to reproduce complex surface geometries. Acoustic metrics including Overall Sound Pressure Level (OASPL), Effective Perceived Noise Level (EPNL), and frequency spectra are evaluated alongside thrust generation to assess design effectiveness. Baseline testing in an anechoic chamber will support future correlation between simulations and experimental data. Through a collaboration between the NIAR and Dassault Systèmes, this research aims to establish a predictive computational framework for open rotor systems and advance noise mitigation strategies through biomimetic principles, ultimately enabling quieter, more eco-friendly propellers without sacrificing performance.

High-Fidelity Computational Approach to Study sUAS Aerodynamic Degradation in Rime Ice Conditions

Edwin Daniel, Research Associate, Wichita State University – NIAR

Ice accretion has been a critical safety concern in aviation since its earliest days and continues to challenge the aerospace community despite significant research and technological progress. Ice buildup alters aerodynamic characteristics, reduces control surface effectiveness, and increases operational risk, contributing historically to numerous accidents. While most icing simulation research has focused on airfoil or wing section geometries supported by 2D and quasi 3D validation datasets, predicting ice accretion and its aerodynamic impact on full aircraft configurations remains difficult because of complex three-dimensional icing physics and the limited availability of high-fidelity validation data. Through a collaboration between the National Institute of Aviation Research and Dassault Systèmes, this study investigates the capability of PowerFLOW, a Lattice Boltzmann

Method (LBM) solver, to predict rime ice accretion and resulting aerodynamic penalties on a small Unmanned Aerial System (sUAS). The analysis emphasizes key aerodynamic metrics including lift, drag, and moments as well as detailed flow phenomena such as pressure distribution, stall onset, increased skin friction drag and turbulence interactions. These simulations will be validated using experimental data from wind tunnel testing at the Walter H. Beech Wind Tunnel, where the complete accreted rime ice geometry will be reproduced on the sUAS using additive manufacturing processes to accurately measure aerodynamic penalties. The resulting framework highlights the potential of LBM based methodologies to predict icing effects without dependence on specialized icing facilities or equipment, providing a foundation for future research aimed at reducing operational risk and improving flight safety in severe weather environments.

FEA Approach for Equivalent Static Modes

Tim Hunter, President, Wolf Star Technologies

The use of finite element analysis is widely prevalent for the analysis of structural dynamics of complex systems¹. A common approach in such analysis is the calculation of transient response using a modal superposition methodology that primarily relies on the eigenmodes of the structure. Typically, several changes are made in the early design iterations until all functional and performance requirements are satisfied by a design engineering team. While the design changes are being made, it can be very time consuming to run an updated finite element analysis (FEA) eigenmode and transient response for each design iteration that may require repeated meshing and multiple checks for convergence. Furthermore, subsequent design changes will not be able to use the modal participation factors from the transient response of the previous design. This study proposes a methodology that utilizes equivalent static mode condensation² to estimate the dynamic response of a system by leveraging previously calculated modal participation factors. Such an approach does not require a new eigenmode and transient response solution for every design iteration. The proposed approach is demonstrated through two examples – one for a beam with varying sizes of holes and slots and another one for a small tractor frame structure with several small and significant design changes. As can be observed from the results, very good correlation is seen for incremental but significant changes of design iterations. Even with relatively large design changes, it is observed that the structural response from the equivalent static mode condensation yields comparable results. The methodology proposed in this study is expected to yield a reasonable estimation as long as the boundary conditions do not change during multiple stages of the design iterations during initial phases of design. The primary benefit of this approach is a significant reduction in computation time and an overall reduction of the product development time. Similar approaches can be seen from other studies in the existing literature.³

¹Roy, D., Rao, G. V., *Elements of Structural Dynamics: A New Perspective*, Wiley, 2012.

²Cammarata, A., Sinatra, R., Maddio, P. D., *Static condensation method for the reduced dynamic modelling of mechanisms and structures*, *Archive of Applied Mechanics*, 89, 2033-2051, 2019.

³Franke, M., Krause, T. J., Wagner, M., *Data-driven model order reduction with surrogate elements for transient simulations*, *Engineering Computations*, 1-26, 2025.

Partner Presentations

Automated Polymer Material Characterization for Abaqus Using VALIMAT®-AUTOFIT Workflow

Arjun Balagopal Menon, Development Engineer VALIMAT®, 4a engineering GmbH

Bridging experimental material testing and finite element simulation remains a key challenge in polymer modeling because of the nonlinear and rate-dependent behavior of polymer materials. This presentation demonstrates how an automated workflow can connect standardized polymer testing directly to Abaqus simulation, enabling faster and more reliable deployment of material models in industrial environments. The proposed approach integrates experimental test data obtained from IMPETUS® and LINOVIS® testing systems, while remaining fully compatible with other standard mechanical test equipment, into the VALIMAT® material calibration environment. Elastic and viscoplastic material parameters are identified automatically using optimization-based fitting procedures. By minimizing manual interaction, the workflow improves material characterization consistency and repeatability across multiple loading conditions. A central element of the methodology is the direct generation of Abaqus-compatible material cards following calibration. This removes additional manual translation steps and allows simulation engineers to move efficiently from physical testing to validated finite element models within a single, traceable process. The workflow is demonstrated using a representative polymer case study, showing good agreement between experimental results and Abaqus simulations. Compared to conventional manual calibration approaches, the automated process significantly reduces material characterization effort while maintaining reliable simulation accuracy, making it well suited for industrial polymer simulation workflows.

Authors: Arjun Menon, Martin Schwab

Introducing Coreform IGA for Abaqus – Empowering Meshing-Free Workflows for Abaqus Simulations

Michael Scott, Executive Chairman, Coreform Inc.

Coreform IGA for Abaqus brings meshing free, CAD exact isogeometric analysis (IGA) to the Abaqus ecosystem. Built on Coreform's Flex Representation Method, it enables Abaqus users to run analysis directly on CAD geometry, cutting the time typically spent creating, repairing, and validating finite element meshes. We will walk through the user workflow integrated into Abaqus/CAE, from CAD import and trimming aware model setup through job submission to Abaqus/Standard and post processing in familiar Abaqus tools. We give an intuitive explanation of two enabling concepts: Bézier extraction, which makes spline bases (IGA bases) compatible with standard finite element assembly and integration, and trimming which preserves exact CAD boundaries and small features without mesh induced distortion. Attendees will see how spline-based discretizations deliver smooth solution fields, accurate stresses, and rapid convergence per degree of freedom — often reducing the need for extensive mesh convergence studies. Benchmark and industrial examples will compare accuracy and turnaround time against conventional FE models while leveraging existing Abaqus capabilities such as material models, analysis procedures, loads, boundary conditions, and output requests. We conclude with current product capabilities, recommended use cases, and a forward look at planned extensions, positioning Coreform IGA for Abaqus as a practical step toward CAD to analysis workflows for everyday Abaqus simulations.

Multiphysics of Oxidation and Fatigue in Elastomer Automotive Applications

William Mars, President, Endurica LLC

The oxidation of elastomers in automotive applications significantly reduces fatigue life because of the simultaneous, coupled evolution of material stiffness and strength properties, and crack growth. The new Endurica MP multiphysics fatigue solver offers the ability to capture such effects and their impact on structural response and fatigue performance. Endurica MP features material models for simulating viscoelastic and exothermic self-heating, for rate of oxygen consumption, for stiffness, strength and crack growth property evolution with temperature and oxygen exposure. It can be coupled with Abaqus structural, thermal and mass diffusion analyses to enable highly realistic simulations of real world use cases. It can also be coupled with the Endurica CL, DT and EIE solvers to enable simulation of fatigue performance using infinite life, safe life and damage tolerant analysis workflows. Validation cases are presented highlighting comparison of simulation results with published experimental studies of aerobic and anaerobic ageing by Gillen and by Ahagon.

An Investigation into Multispecies Fluid Flow (Free Surface) Utilizing High Performance Computing and Cloud Solve

Robert Warren, Simulation Specialist Manager, GoEngineer

In this session, we will explore the application of multispecies fluid dynamics to the design of an engine coolant reservoir. The model and methodology were developed for a GoEngineer customer to support informed decision-making for a complex CFD challenge. Using multiple Computational Fluid Dynamics tools — **3DEXPERIENCE** Fluid Dynamics Engineer and SOLIDWORKS Flow Simulation — we will compare model setup approaches, solver capabilities, and solution performance. A detailed comparison of solve times leveraging High-Performance Computing (HPC) and Cloud Solve resources will be presented. Finally, we will interrogate and compare results from both platforms, discussing the strengths, limitations, and ideal use cases of each solution to help attendees better understand how to select the right CFD approach for advanced engineering problems.

A Concept Model for Voltage Drop Simulation in Wire Harness Crimping

Ankur Kumar, Senior Applications Engineer – Simulation, Tata Technologies

This session covers a methodology to simulate the voltage drop in the process of crimping a bundle of wires in a cable. Such models are multi-physical in nature that couple electrical, thermal and structural domains. The session explains fundamentals of information flow between multiple physical domains as well as input data required. The simulation roles available on the 3DEXperience platform are used to set up the model. Such applications are useful in transportation and mobility industry to design and simulate harness cables, windscreen defoggers and more.

Become a Simulation Olympian: The Analyst's Journey on the 3DEXPERIENCE Platform

Benjamin Beckelynck, Technical Manager Simulation CFD, Technia

In today's competitive engineering landscape, simulation teams must deliver results faster, with greater robustness and traceability. This presentation introduces a structured "Analyst's Journey" on the **3DEXPERIENCE** platform — progressing from Bronze to Olympian level — to transform simulation practices through MODSIM integration. Starting with improved FE model preparation, attendees will learn how to reduce meshing time by up to 50% while increasing model quality and ensuring full traceability. At the Bronze level, Parametric Design Studies enable rapid exploration of design variables, tolerances, and load cases, supporting DOE, optimization, and risk assessment. At the Silver and Gold levels, simulation processes are formalized using Process Composer and Engineering Templates, capturing best practices and reducing model preparation time by up to 90%. These methods standardize workflows, integrate multiphysics and third-party tools, and preserve simulation expertise without complex scripting. Finally, the Olympian level demonstrates how Process Studio can deploy simulation as customizable web applications, empowering non-experts to execute validated workflows without opening native simulation software — eliminating repetitive preparation and reporting tasks. Through practical examples and measurable productivity gains, this session illustrates how organizations can scale simulation, improve collaboration, and truly work smarter with MODSIM on the **3DEXPERIENCE** platform.

TotalCAE HPC Technology Choices for Accelerating the SIMULIA Portfolio

Rod Mach, President, TotalCAE

The SIMULIA portfolio from Dassault Systèmes — including Abaqus, Isight, Tosca, fe-safe, CST Studio Suite, and more — powers critical multi-physics simulations across industries. Maximizing the performance and scalability of these tools requires carefully selected high-performance computing (HPC) technologies.

Same Goals, Different Rules: FEA Automation Then and Now

Tom Feister, Technical Manager, Structures, TriMech Solutions

The goal of FEA automation hasn't changed — reduce manual effort, increase throughput, and make simulation-driven design a reliable part of the engineering process. What has changed is the platform. This presentation takes a candid, comparative look at the automation strategies available in Abaqus CAE and Isight versus those offered by the **3DEXPERIENCE** platform, exploring how familiar approaches — scripting, process templating, and workflow integration — are reimagined in a cloud-connected, data-centric environment. From Python scripting in Abaqus CAE to the structured simulation templates and app-based automation of **3DEXPERIENCE**, we will

examine how the building blocks of automation have evolved, what transfers directly from one platform to the other, what requires rethinking, and where entirely new capabilities emerge. Whether your automation toolkit today is built on Isight process flows, custom scripts, or a mix of both, this session offers a strategic perspective on navigating the transition and positioning your team for the workflows of tomorrow.

Customer Success with Abaqus and VIAS3D

Shawn Freeman, Executive Director / VP, VIAS3D

How do leading teams turn simulation into real business impact? In this session, Shawn Freeman explores how organizations are accelerating innovation, reducing risk, and driving measurable results using Abaqus—powered by VIAS3D’s expertise. From real-world use cases to proven strategies, discover how to move beyond analysis and turn simulation into a competitive advantage that delivers true customer success.

Enabling Agile Design Reviews for ABAQUS users: Transitioning from Static Reports to Interactive 3D Slides / Workflows

Prasad Mandava, CEO, Visual Collaboration Technologies Inc.

Abaqus delivers high-fidelity structural and multiphysics simulation results that enable engineers to predict complex product behavior with confidence. However, despite advances in solver capability, many organizations still communicate these rich results through static 2D slide decks during design reviews. This traditional reporting model limits agility. When unexpected technical questions arise — such as alternate load cases, nonlinear contact behavior, hotspot validation, or iteration comparisons — analysts must reopen large ODB files in full post-processors or defer discussion to prepare additional slides, slowing decision cycles. This presentation explores a modernized review methodology designed specifically for Abaqus-centric workflows. The approach focuses on automated extraction of key response quantities from ODB files — such as stress, strain, displacement, contact pressure, and failure indices — into lightweight, structured 3D review artifacts that preserve full simulation context while remaining accessible in a browser-based environment. Unlike static reports, interactive 3D review workflows enable engineers to:

- Probe field output values in real time
- Dynamically switch between steps, increments, and load cases
- Navigate assembly structures and element sets
- Compare design iterations interactively
- Add contextual annotations during live review sessions

By decoupling result communication from heavy post-processing environments, teams can answer technical questions during the meeting itself rather than postponing decisions. Drawing from industrial implementation examples, the session demonstrates how structured automation and interactive review workflows reduce post-processing effort, improve cross-functional collaboration, and accelerate engineering decision-making. The methodology remains fully compatible with existing Abaqus solver processes and broader SIMULIA-driven SPDM initiatives. Attendees will gain practical guidance for transforming traditional simulation reporting into an agile, decision-ready review architecture.

Load Reconstruction with Wolf Star Technologies’ True-Load

Tim Hunter, President, Wolf Star Technologies

One of the most common challenges of mechanical product development is driving accurate structural simulations. Wolf Star Technologies provides an innovative software platform, True-Load, to better understand operational loads and corresponding structural response through load reconstruction. True-Load guides the design process from start to finish. (1) True-Load/Pre-Test finds optimal strain gauge placement for load reconstruction. (2) After data is collected, True-Load/Post-Test calculates time histories of loads from strain measurements. (3) True-QSE shows the operating deflection shapes in response to the calculated loads. Loads calculated with True-Load can be applied to re-designed FEA models, enabling virtual design iterations and FEA-based fatigue with tools fe-safe or other durability tools.

Dassault Systèmes Presentations

3DEXPERIENCE Multiphysics 2026

Victor Oancea, Dassault Systèmes

Multiphysics and Multiscale (MPMS) covers the topic of seamlessly coupling multiple physics together at the same scale as well as across multiple scales for the study of complex interactions between physics and scales of a systems. In reality, all engineering problems are inherently Multiphysics and Multiscale in nature. With increasing product complexity and the need to meet simultaneous competing design requirements, the need to account for the complex interactions between multiple physics and scales has grown recently and will continue to grow. Connecting the dots in our portfolio of market leading technologies and applications on the 3DEXPERIENCE platform for multiple disciplines (Structures, Fluids, Electromagnetics, Motion, etc.) integrated with modeling and lifecycle values of the platform moves us closer to realize simulation for predicting real world scenarios. This session will cover the status of Multiphysics coupling capabilities in 3DEXPERIENCE.

Electromagnetic Simulations: Enabling Critical Applications Across Industries

Frank Scharf, SIMULIA Technical Sales Director, Scott Piper, SIMULIA Industry Process Consultant Senior, Sebastian Kizewski, SIMULIA Electromagnetics Industry Process Consultant, Dassault Systèmes

Electromagnetic (EM) simulations drive innovation in diverse sectors, from transportation to healthcare. In electric vehicles, EM optimizes motor efficiency and wireless charging systems. Smartphones rely on EM for antenna design, signal integrity, and 5G connectivity. Aerospace applications leverage EM for radar, satellite communications, and aircraft antenna placement. Industrial automation depends on EMC compliance to mitigate interference in robotic systems, ensuring reliable operation. In medicine, MRI technology — rooted in EM principles — enables precise diagnostics. This talk explores how EM simulations enhance performance, safety, and functionality in these key applications, demonstrating their indispensable role in modern engineering and technology.

Electromagnetics Technology Updates 2026

Frank Scharf, SIMULIA Technical Sales Director, Scott Piper, SIMULIA Industry Process Consultant Senior, Sebastian Kizewski, SIMULIA Electromagnetics Industry Process Consultant, Dassault Systèmes

This session will include new features and workflow and R&D/AI roadmap for CST Studio Suite, OPERA, IVCAD Suite, Antenna Magus, Idem and Manatee.

Fluids Portfolio & AI/ML for Fluids R&D Updates

Nicolas Fougere, Worldwide SIMULIA Fluids, Industry Process Consultant Manager, Dassault Systèmes

With its Lattice-Boltzmann Method and Navier-Stokes solvers, SIMULIA offers a comprehensive Fluids portfolio covering a broad spectrum of simulation workflows across industries, enabling accurate and efficient modeling of complex fluid phenomena at scale. This session will highlight key enhancements introduced over the past year across SIMULIA's Fluids roles including the addition of a new native thermal solver, expanded multiphase capabilities, deeper cloud integration and continued advancements in GPU acceleration to significantly reduce simulation turnaround times. Machine Learning is rapidly transforming how simulation technologies are used across industrial applications, enabling faster insights and more efficient design processes. This presentation provides an update on the ongoing research and development efforts for machine learning-based surrogate models with SIMULIA's Fluid solutions, highlighting recent progress in integrating data-driven approaches with high-fidelity simulation workflows to enable faster decision-making.

Modeling & Simulation Update

Abelardo Garza, SIMULIA R&D Roles Portfolio Senior Manager, Christina Feist, SIMULIA R&D | Generatives Experiences Roles Portfolio Director, within Generative Experiences & Andras Laszloffy, Senior Director of R&D, Dassault Systèmes

What's new in Structures apps? Discover the latest enhancements in SIMULIA structural simulation roles on the 3DEXPERIENCE platform. Our 3DEXPERIENCE product offering delivers comprehensive structural simulations capabilities, covering statics, implicit and explicit dynamics, vibration, thermal analysis, and fatigue across a

range of industrial applications. In this session, we will dive into key recent enhancements in geometry idealization, meshing, scenario setup, and results exploration — all within a unified modeling and simulation environment powered by a common data model, unlocking new possibilities for structural simulations.

3DEXPERIENCE Process Automation and Design Exploration Update This session explores the newest breakthroughs transforming engineering on the **3DEXPERIENCE** platform. Attendees will learn how automation, AI-driven assistants, and physics-based virtual twins are reshaping design workflows across single and multidisciplinary domains. The agenda highlights emerging capabilities that democratize advanced engineering, accelerate design exploration, and connect modeling, simulation, and decision-making in a unified environment.

Multibody Systems Dynamics Update

Armin Veitl, Industry Consultant Manager, Dassault Systèmes

Introduction and updates to the SIMULIA Simpack multibody state of technology. SIMULIA Simpack is a comprehensive software suite designed for the development and simulation of high-fidelity multibody system virtual prototypes for mechanical and mechatronic systems.

- This session will explore Simpack's latest features and capabilities, including advancements in solver technology, real-time simulation, flexible body dynamics, Contact, Simpack Pre, Post and Wizard; specific updates for Simpack Automotive, and Machinery applications will also be highlighted
- Join us to explore how this state-of-the-art technology enhances simulation capabilities and streamlines the product development process

Structures Update

Ross McLendon, Abaqus Product Manager, Mikhail Belyi, Structural Dynamics and Solvers Technology Director, Prashanth Vijalapura, Contact and Constraints Structures Software Engineering Director & Sandeep Kulathu, Nonlinear Mechanics Software Engineering Senior Manager, Dassault Systèmes

Abaqus FEA is the technological heart of structural simulation at Dassault Systèmes, providing highly performant and realistic linear and nonlinear mechanics simulation as a standalone solver and as part of the **3DEXPERIENCE** platform. In this 90 minute session, you'll hear from members of our product and development teams about enhancements that have been made over the past year to deliver new workflows and drive next-generation performance and scalability:

- **Introduction, CAE, Cloud, & HPC** – This brief presentation will open the session with a high-level update overview of Abaqus and some additional details of enhancements in Abaqus/CAE, cloud, and recent advances for HPC and co-simulation
- **Solvers & Linear Dynamics** – This segment will cover updates to our implicit solver technology and linear dynamics capabilities in Abaqus/Standard
- **Contact & Constraints** – This segment covers updates and improvements to our contact and constraints capabilities in Abaqus/Standard and /Explicit
- **Nonlinear Mechanics** – This segment covers updates to Nonlinear Mechanics technology in Abaqus/Standard and Abaqus/Explicit, including materials modeling, coupled multiphysics, element technology, particle methods, fracture and more

Vibro-Acoustics Update

Phil Shorter, Dassault Systèmes

Noise and vibration are becoming increasingly important in virtually every industry. Typical applications include: designing for interior noise in cars, aircraft, trains, ships, cabs and buildings; designing for exterior noise in wind turbines, Urban Air Mobility, tires and pass-by noise; designing for dynamic environments and shock in spacecraft and launch vehicles; designing for stealth in ships, submarines and UAVs; designing for sound quality and speech intelligibility in mobile phones, loudspeakers and public address systems. In many of these applications it is important to consider noise and vibration across the entire audible frequency range. This requires the use of a combination of simulation methods, including both low frequency mesh-based methods and mid/high frequency statistical wave based methods. SIMULIA's vibro-acoustic simulation software wave6 includes the full spectrum of vibro-acoustic analysis methods in order to efficiently simulate noise and vibration

across a broad frequency range. This presentation provides an overview of recent wave6 product and application updates.