Call for Papers

Uncertainty Quantification Conference

AIAA SciTech 2027, January 11-15, 2027, Orlando, FL

Uncertainty Quantification (UQ) conference (*previously, Non-Deterministic Approaches (NDA) conference*) encompasses methods and technologies for understanding, quantifying, and managing uncertainty in the design, manufacturing, testing, and operation of aerospace systems. These approaches integrate computational, experimental, and data-driven techniques to characterize uncertainty; propagate it through complex, multidisciplinary systems; enable design and optimization under uncertainty; and assess system reliability and risk to support informed decision-making. The conference welcomes advances in uncertainty quantification, verification and validation (V&V), risk analysis, probabilistic surrogate modeling, digital twins and digital threads, AI/ML-enabled uncertainty methods, and decision-making under uncertainty. Contributions spanning foundational methodological developments, novel algorithms, and high-impact aerospace applications are encouraged. The UQ conference serves as a premier forum for researchers, practitioners, and industry leaders to exchange advances in theory, algorithms, and real-world implementation of uncertainty quantification and management across aerospace.

Student submissions are welcome and strongly encouraged. Eligible papers *submitted directly by selecting Uncertainty Quantification (UQ) as the topic* will be considered for the **Southwest Research Institute Student Paper Award in Uncertainty Quantification** (with a monetary award of $500 and a certificate).

Topics of specific interest include, but are not limited to:

- Bayesian Methods for Uncertainty Quantification
- Risk and Reliability Analysis
- Multifidelity Methods for Uncertainty Quantification and Decision-Making
- Model order reduction and surrogate modeling (UQ/MDO)
- Certification by Analysis Challenge Problem (CFD2030/APA/UQ)
- Uncertainty Quantification and Risk Analysis in Structures (UQ/STR)
- Physics-Informed Machine Learning (MDO/UQ)
- Multi-disciplinary design and decision-making under uncertainty (UQ/MDO/DE/ACD)
- V&V and Uncertainty Quantification in Digital Twins/Threads, and Digital Eng. (DGE/DE/UQ)
- Verification Techniques in Computational Physics (oral only FD/MVCE/UQ)
- Uncertainty Quantification, Grid Quality, & Error Estimation for Computational Physics (MVCE/FD/UQ)
- Special Session: Quantum Computing for Fluid Dynamics (only by invitation, FD/UQ/MST)
- Surrogate Modeling and Adaptive Meshing for Multi-Physics Flow Systems (MVCE/FD/UQ)
- Uncertainty Quantification for AM and Composite Material Characterization (UQ/MAT)
- Uncertainty Quantification in GNC (UQ/GNC)
- Uncertainty Quantification and Management in Aerospace - General

Detailed deadline information, abstract preparation instructions, and policies can be found at: https://www.aiaa.org/SciTech/call-for-content/call-for-papers. For more information, contact one of the following organizers:

Anirban Chaudhuri	University of Texas at Austin	anirbanc@oden.utexas.edu
Erin DeCarlo	Southwest Research Institute	erin.decarlo@swri.org

The AIAA Uncertainty Quantification and Materials Technical Committee
are sponsoring a Joint Session on

Uncertainty Quantification for AM and Composite Material Characterization (UQ/MAT)

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The AIAA Uncertainty Quantification (UQ) and the Materials (MAT) Technical Committee are soliciting papers with recent research, methodological advances, and industrial applications related to **Uncertainty Quantification (UQ) for AM and Composite Material Characterization**.

Authors are invited to submit papers that integrate modeling and experimentation for material characterization from data with focus on verification, validation, and uncertainty quantification. Topics of interest include characterization of material uncertainty in advanced manufacturing and composite manufacturing processes, probabilistic model calibration and validation, uncertainty propagation through multi-scale materials models, and risk analysis arising from material variability.

For more information, contact one of the following organizers:

Anirban Chaudhuri (UQ)	University of Texas at Austin	anirbanc@oden.utexas.edu
Yumeng Li (MAT)	University of Illinois at Urbana Champaign	yumengl@illinois.edu

The AIAA Uncertainty Quantification and Guidance, Navigation, & Control Technical Committee are sponsoring a Joint Session on

Uncertainty Quantification in GNC (joint UQ/GNC)

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This joint track, co-hosted by the UQ and GNC Technical Committees, invites papers on uncertainty quantification for guidance, navigation and control methods for aerospace vehicles. Aerospace vehicles operate in an uncertain environment; hence, they experience random forces, making their dynamics uncertain. The model parameters, initial and boundary conditions are not known precisely. Furthermore, structures and actuators have uncertain properties compared to the tested ones. Therefore, it is of utmost importance to account for these uncertainties in the operation of these vehicles to achieve targeted maneuvers.

Examples of specific topics for this area include, but are not limited to, the following:

- Accurate and efficient propagation of uncertainty through dynamical models
- Propagating the effect of model, data, and operational uncertainty to future predictions from the model
- Different mechanisms to represent the uncertainty in models
- Quantifying the effect of model state uncertainty on accuracy of the GNC system
- Optimal-control or decision-making strategies while accounting for uncertainty

Note that submission to this joint track requires adherence to the GNC requirement of a full draft manuscript, which must include sufficient detail to allow informed evaluation by the assigned reviewers. Extended abstracts will be returned without review. Full draft manuscripts must not exceed a total length of 25 pages, formatted in accordance with the AIAA SciTech manuscript template.

Technical Area Co-Chair (UQ)
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The AIAA UQ, FD, and MVCE Technical Committee are sponsoring a Joint Session on

Verification Techniques in Computational Physics (Oral Only, MVCE/FD/UQ)

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In computational physics codes, verification and validation of the implementation and suitability of the governing equations are necessary to develop confidence in the credibility of the simulations. Verification assesses the accuracy of the numerical solutions the code produces, relative to the assumptions and expectations associated with the numerical methods.

Verification can be divided into code verification and solution verification. Code verification focuses on the correctness of the numerical-method implementation in the code (numerical-error evaluation), whereas solution verification focuses on numerical-error estimation for simulations that do not have an exact solution available. Spatial and temporal discretization are often the primary focus of code verification and are typically checked using manufactured and/or exact solutions and grid/time-refinement studies. On the other hand, grid/time-refinement studies are not the only techniques proposed in the literature to address error estimation. However, most (if not all) of the proposed techniques require data in the so-called 'asymptotic range'. Such a requirement makes solution verification troublesome in practical calculations.

Topics of interest include manufactured solutions, exact solutions, and other code-verification techniques, as well as error-estimation (solution-verification) techniques, for computational physics codes. Physics disciplines are not limited to fluid dynamics.

Please select the "Verification Techniques in Computational Physics" sub-topic under "Uncertainty Quantification (UQ)" or "Meshing, Visualization, and Computational Environments (MVCE)" or "Fluid Dynamics (FD)" during submission.

For more information, please contact the session organizer:

Brian Freno
bafreno@sandia.gov
Fluid Dynamics Technical Committee

The AIAA Uncertainty Quantification and Structures Technical Committee
are sponsoring a Joint Session on

Uncertainty Quantification and Risk Analysis in Structures (UQ/STR)

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The AIAA (American Institute of Aeronautics and Astronautics) Uncertainty Quantification Technical Committee and the Structures Technical Committee are soliciting papers with recent research and technological advancements regarding **UQ and Risk Analysis in Structures**.

Uncertainty Quantification methods are technologies aimed at understanding and managing various sources of uncertainties and associated risks inherent in physical structures' design, production, and operation. These technologies include computational and experimental methods to quantify and propagate uncertainty in complex structures, assess risk, support decision-making under uncertainty, and enable robust designs that account for variability in structural performance.

We invite you to submit abstracts for the special session on uncertainty quantification applied to aerospace structures (both metallic and composites). The structural analysis can be of linear or nonlinear static, buckling, vibration, fatigue, and flutter. The solicited topics include but are not limited to, the following:

- Uncertainty quantification (UQ) and risk modeling in aerospace materials and structures
- Uncertainty propagation and sensitivity analysis for complex aerospace structural responses
- Bayesian inference for updating uncertainty using test, inspection, and flight/operational data
- Multi-fidelity methods (high-fidelity simulation, reduced-order models, and experiments)
- Multi-scale UQ and risk assessment linking material/process variability to component- and system-level performance
- Risk-informed structural design and optimization (robust design and risk-based formulations)
- Probabilistic risk assessment of structural performance for static, dynamic, stability/buckling, fatigue, fracture, and aeroelastic responses
- Risk-informed decisions across the structural life cycle, including certification, inspection planning, maintenance, and sustainment under uncertainty

Make sure to select the "UQ and Risk Analysis in Structures" topic option under "Uncertainty Quantification" or "Structures" technical discipline when prompted during submission.

For more information, contact one of the following organizers:

Anirban Chaudhuri	University of Texas at Austin	anirbanc@oden.utexas.edu
Sean Taylor	Gulfstream	sean.taylor@gulfstream.com

The AIAA Uncertainty Quantification, CFD Vision 2030, and Applied Aerodynamics are sponsoring a Joint Session on

Certification by Analysis Challenge Problem (CFD2030/APA/UQ)

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The AIAA CFD Vision 2030, Uncertainty Quantification (UQ), and Applied Aerodynamics (APA) Technical Committee are soliciting papers addressing the challenge problem on **Certification by Analysis**. More details on the challenge problem can be found in https://www.aiaa-uq4cba.org/.

Make sure to select the "Certification by Analysis Challenge Problem" topic option under "CFD Vision 2030 (CFD2030)" or "Uncertainty Quantification (UQ)" or "Applied Aerodynamics (APA)" technical discipline when prompted during submission. Submissions should include the following sentence at the top of their abstracts: *"This abstract is submitted to the AIAA SciTech 2027 Certification by Analysis Challenge Problem Special Session."*