



Modeling and Simulation Technologies

Call for Papers: Additional Details

Abstract Submission Guidelines

Sponsored by the Modeling and Simulation Technologies Technical Committee

Prospective authors are asked to submit their work electronically through the AIAA AVIATION website prior to the published deadline (www.aiaa.org/aviation). Authors may submit either an extended abstract of 1,000 words, or a draft of the paper itself, if available. Draft papers must include a 100- to 200-word abstract.

The manuscript, whether an extended abstract or draft paper, must include a discussion on the background and motivation for the work, as well as an explanation of the paper's main contributions to the particular area(s) of interest, including examples of results. The inclusion of the paper in the conference will depend solely on the quality and detail of the submitted manuscript.

Each submission will be reviewed by at least three members of the Modeling and Simulation Technical Committee. Authors submitting extended abstracts are encouraged to include as many details about their work as possible to help reviewers make informed evaluations.

At each conference, members of the Modeling and Simulation Technical Committee sit in the audience and judge all presentations as the first step of their selection of a best paper at the conference. The papers associated with the best presentations in each session will be evaluated further. The best overall paper will be awarded at the conference the following year and winners receive a cash award.

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Subtopic Descriptions

Modeling and Simulation Technologies seeks papers on the latest findings in the development and application of modeling and simulation as related to three categories: Flight Simulation, Traffic Management Simulation, and Human Decision-Making Support.

Flight Simulation

Modeling and Simulation of Aircraft Dynamics, Systems, and Environments (including Uninhabited Aerial Systems [UAS] and Urban Air Mobility [UAM] Vehicles)

Papers are sought that describe the modeling and real-time simulation of vehicle dynamics and vehicle systems, and the environments in which they operate. This includes, but is not limited to, fixed wing aircraft, rotorcraft, uninhabited aerial systems (UAS), and urban air mobility (UAM) vehicles. Furthermore, multi-disciplinary modeling and simulation that spans across domains is increasingly popular. Papers are sought that integrate novel modeling and simulation approaches across two, or more, domains. For example, integrating structural dynamics and computational fluid dynamics (CFD). Note, submissions relating to exclusive disciplines such as CFD alone without an obvious link to flight simulations are more appropriate for other topics. There is a strong preference for papers which demonstrate integration with real-time, real-time capable or human-in-the-loop vehicle simulations.

Modeling and Simulation for Certification and Qualification

Modeling and simulation have become essential tools in the certification process of new commercial aircraft. In addition, the introduction of autonomous aircraft in civil airspace, such as uninhabited aerial systems (UAS) and urban air mobility (UAM) vehicles, require novel certification approaches based on modeling and simulation. Papers are sought that describe the use of modeling and simulation for the purposes of certification and qualification of new aircraft. Topics of interest include, but are not limited to, expanding the use of simulation for handling quality certification of new and derivative aircraft designs, the use of simulation for the certification of autonomous aircraft, and the design of flight tests to validate these simulations.

Simulator Hardware and Facilities

Papers are sought involving all aspects in the design, development, and use of motion systems, visual systems, and other simulator hardware, as well as image generation. Papers that discuss novel motion configurations and hardware as well as the application of motion for research and training are highly encouraged. Papers on motion and visual system technologies that improve simulation fidelity and effectiveness are also highly encouraged. In addition, papers are sought on the development of new simulator facilities.

Model-Based Design and X-in-the-Loop Simulation

Model-based development is an emerging approach to engineering that positions models as the core assets of systems development. Papers are sought that describe novel approaches and new tools in model-based development in the aerospace field. Additionally, papers are sought which describe alternative development processes that use Agile development or systems modeling (e.g., SysML) methods. These topics are rapidly penetrating the modeling and simulation aerospace design community as a means of reducing cost while increasing productivity. Furthermore, papers are sought on the development and use of model-in-the-loop, software-in-the-loop, processor-in-the-loop and hardware-in-the-loop simulations. Topics of interest span from model or software in the loop simulation development to system integration laboratories for hardware-in-the-loop testing of modern fly-by-wire systems, integration and testing of modern avionics and synthetic vision systems, and autonomous flight systems integration and testing.

Traffic Management Simulation

Modeling and Simulation of Air Traffic Management (ATM)

Papers are sought that describe the use of human-in-the-loop simulations in air traffic management concept development, testing, and analysis. Topics of interest include, but are not limited to, simulation studies that investigate air traffic management automation concepts and decision support tools, airspace and airport traffic modeling methods, and model validation and verification experiences and methods. Of special interest is the concept validation of Trajectory Based Operations (TBO), Time-Based Flow Management (TBFM), terminal operations, and Traffic Management Initiatives (TMIs), etc.

Modeling and Simulation of New Entrant Integration into the National Airspace System

Papers are sought where various modeling and/or simulation techniques have been used to help further the understanding of new entrant integration into the national airspace system (NAS). This topic includes new entrants at high altitudes, such as super supersonic aircraft, as well as new entrants at lower altitudes such as Urban Air Mobility (UAM) vehicles and small uninhabited aerial systems (UAS). The use of modeling and simulation for new entrant integration is key to understanding its implications on the NAS.

Modeling and Simulation of UAS Traffic Management (UTM)

Papers are sought that describe the use of flight simulations in UAS Traffic Management concept development, testing, and analysis. Topics of interest include, but are not limited to, simulation studies that investigate UTM concepts including the interplay of autonomous vehicles and UTM, airspace and traffic modeling methods for UTM operations, and model validation and verification experiences and methods.

Modeling, Simulation, Machine Learning, and Optimization for Air Traffic Performance

Papers are sought on the use of Machine Learning, Agent-based modeling and Artificial Intelligence in support of real-time simulation and/or decision support of national airspace system (NAS) performance. Topics of interest include, but are not limited to, machine learning for real-time constraint prediction; modeling and simulation of multi-stakeholder interactions, negotiations, and cooperation; artificial intelligence for control of TMIs; terminal area management; etc.

Human Decision-Making Support

Human Factors, Perception, and Cueing

Papers are sought in the broad area of human factors, perception, and cueing. Of particular interest are the human perception of the essential cues in flight and the reproduction of these cues in a simulator. A related topic is the application of existing knowledge on perception and cueing for understanding and measuring simulation fidelity. Papers on human factors related to the pilot-vehicle interface, augmented and virtual reality, novel methods to model human performance and behavior, new pilot training evaluation techniques, and novel data processing and visualization techniques applied to (human-in-the-loop) simulations are of special interest.

Cognitive Assistance for Training and Decision Support

Papers are sought on the integration and distillation of modeling-and-simulation-derived information for real-time human decision making. As similar technologies may also be leveraged for pilot or traffic manager training, papers discussing improved training exercises are welcomed. Topics of interest include, but are not limited to, the design interfaces that leverage complex algorithmic output for real-time human interaction, demonstration of human-in-the-loop acceptance of proposed concepts, human language technologies for clearance delivery and/or improved scenario development etc.