

STS

Integrating AI and Fluid Dynamics

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Abstract

The integration of Artificial Intelligence (AI) and Fluid Dynamics is opening new frontiers in computational modeling and simulation. This Special Technology Session (STS) is dedicated to exploring cutting-edge methodologies that leverage data-driven approaches to enhance, accelerate, and redefine traditional fluid mechanics analyses. We invite contributions on a wide range of topics, including but not limited to: AI-augmented turbulence modeling and closure strategies, physics-informed neural networks (PINNs) for forward and inverse problems, deep learning techniques for flow field reconstruction and super-resolution, and machine learning-enabled reduced-order modeling for real-time simulation and control. Additional areas of interest encompass AI-empowered aerodynamic shape optimization, data-enhanced experimental methods, and uncertainty quantification in multi-scale flow systems.

A key focus will be placed on hybrid frameworks that integrate physical knowledge with data-driven insights to improve predictive accuracy, computational efficiency, and design innovation. We welcome submissions presenting novel algorithms, rigorous validations, and impactful applications that demonstrate the transformative role of intelligent computational methods in fields such as aeronautics, aerospace propulsion, renewable energy, environmental flows, and biomedical engineering.