Special Issue

Multi-Fidelity Approaches for Modeling, Simulation and Validation in Fluid Dynamics

Message from the Guest Editors

This Special Issue highlights the use of multi-fidelity approaches in the modeling, simulation, and validation of fluid dynamics problems. It encourages studies that combine high-fidelity simulations with reduced- or mid-fidelity models, particularly those supported by experimental validation. Contributions may address model fusion, surrogate modeling, uncertainty quantification, and digital twin development. We also welcome innovative methodologies that leverage artificial intelligence and machine learning for reduced-order modeling, data assimilation, or hybrid physics-informed approaches. A special focus will be given to complex, multi-scale problems involving strong interactions such as fluid–structure interaction, aerodynamic interference effects, and unsteady flow phenomena, where multi-fidelity strategies can play a key role in balancing accuracy and computational efficiency. Both methodological innovations and application-driven research across different fluid dynamic contexts are welcome, including aerospace, energy, and environmental flows.

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Message from the Editor-in-Chief

As the world of science becomes ever more specialized, researchers may lose themselves in the deep forest of the ever increasing number of subfields being created. This open access journal Applied Sciences has been started to link these subfields, so researchers can cut through the forest and see the surrounding, or quite distant fields and subfields to help develop his/her own research even further with the aid of this multi-dimensional network.

Editor-in-Chief

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