OS09 – Numerical Simulation and Modeling of Fluid Machinery Flows

Organizers: Shin-ichi Tsuda (Kyushu University)
Hyeon-Seok Shim (Changwon National University)

This organized session welcomes presentations on numerical simulation and modeling for turbomachinery. In addition to CFD (RANS and LES) for compressors, gas turbines, water turbines, pumps, marine propellers, and similar machinery, fluid-structure interaction analysis and multi-physics/multi-scale analysis including phase change or combustion are also encouraged. We also welcome analyses involving working fluids with thermodynamic conditions significantly different from those at standard temperature and pressure, such as supercritical fluids and cryogenic fluids. Furthermore, the scope includes shape optimization of fluid machinery, analyses employing AI techniques (deep learning/machine learning), reduced-order modeling for complex unsteady flow phenomena, and coupled analyses such as 1D-3D simulations.

Non-exhaustive list of suggested topics

- High-Fidelity CFD Simulation
- Fluid-Structure Interaction
- Multi-Physics/Multi-Scale Simulation Including Phase Change, Combustion, etc.
- Optimization Method for Design of Turbomachinery
- Modeling of Complex/Unsteady Flows in Turbomachinery
- Application of AI Technics (Machine or Deep Learning)
- Compressors, Gas Turbines, Water Turbines, Pumps, Propellers, etc.
- Supercritical Flows, Cryogenic Flows

Organizers

Shin-ichi TSUDA is an associate professor in Department of Mechanical Engineering at Kyushu University, Japan. He received B.S. and M.S. from Tohoku University, and Phd. Eng. from the University of Tokyo. His main research interest is multiscale modeling of cavitating flow in water and in cryogenic fluids such as liquid hydrogen, employing molecular dynamics simulation on bubble nucleation-growth or evaporation/condensation. His modeling on cavitation has been also applied for complex cavitating flows in turbomachinery.

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