Guest Editorial

Special Issue on Computational Fluid Mechanics and Fluid–Structure Interaction Preface

This special issue is a collection of the papers contributed by authors who were invited to speak at the symposium on *Computational Methods for Fluid–Structure Interaction*, ASME International Mechanical Engineering Congress and Exposition, Vancouver, Canada, November 12–18, 2010. The symposium was organized by Yuri Bazilevs (University of California, San Diego), Kenji Takizawa (Waseda University, Tokyo), and Tayfun Tezduyar (Rice University).

The special issue contains papers on advances in computational methods for computational fluid dynamics (CFD) and fluid–structure interaction (FSI). FSI is one of the most important classes of multiphysics problems in modern mechanics. It is currently receiving much attention from the academic community, national laboratories, and the industrial sector.

The papers mostly focus on moving-grid methods, such as the arbitrary Lagrangian–Eulerian and space–time formulations. The methods discussed address the challenges of coupling rigid objects and free-surface flow, coupling of acoustic fluids and structures using a monolithic FSI approach, and coupling of discrete element and finite element methods in the context of particulate flows.

The special issue contains papers on advances in patient-specific cardiovascular hemodynamics, FSI modeling of parachutes, air turbine aerodynamics, aerodynamics of flapping wings, ship hydrodynamics, liquid sloshing in tanks, and turbulence in the upper ocean. Low-order finite element method is the dominant spatial discretization technique in most of the special issue articles. However, spatial and temporal higher-order NURBS-based discretizations, such as those employed in isogeometric analysis, are also discussed and are found to increase the accuracy and robustness of the computations. One of the articles provides the methodology and background mathematical theory for how to correctly define boundary fluxes in coupled multiphysics simulations.

We would like to thank the authors for their efforts in preparing the special issue articles, and for meeting the special issue deadlines. These contributions will undoubtedly help advance the fields of CFD and FSI.

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