

## Fluid–structure interaction

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### Preface

In 2013, we celebrated the **70th Birthday of Thomas J.R. Hughes**, an innovative leader in computational mechanics and a good friend and mentor to many. With a special issue of *Computational Mechanics* in 2014 [1], we recognized Tom Hughes’s contributions and impact in biomedical fluid mechanics and fluid–structure interaction (FSI). With this special issue on FSI, we recognize his impact in a broader FSI area.

Tom Hughes’ work on the arbitrary Lagrangian–Eulerian (ALE) finite element method laid the foundation for much of the ALE-based FSI research we see today. His work on the space–time (ST) finite element method inspired the ST-based FSI research we find in literature. This special issue contains a number of articles based on these two approaches. That is another testament to Tom Hughes’ sustained impact in computational mechanics.

The special issue is a collection of papers on FSI and supporting numerical methods, presenting the state-of-the-art in computational mechanics research. The papers emphasize method and algorithm development, as well as current applications of modern computational fluid mechanics and FSI methods in solving problems of contemporary engineering interest and relevance.

Method development papers include (i) special methods for aerodynamic moment calculations in parachute FSI, (ii) reduced-order models for vibration of structures containing compressible fluids, (iii) fixed-grid methods for multi-fluid flow problems, (iv) FSI in the presence of complex fluids, (v) FSI coupling for aeroacoustics, and (vi) particle-shock interaction in compressible flows.

Papers focusing on algorithm development include (i) “plug-and-play” coupling approaches for multi-field simulations in parallel environments and (ii) goal-oriented adaptivity for viscous incompressible flows.

Application-oriented papers cover a broad range of problems, including (i) propulsion systems involving flexible hydrofoils, (ii) aerodynamics of MAVs with clapping wings, (iii) FSI of the Orion spacecraft drogue parachutes, and (iv) FSI of bioprosthetic heart valves.

The special issue also contains papers on fundamental fluid mechanics and FSI studies involving (i) flow past square cylinders with flexible splitter plates and (ii) dynamics of sedimenting-interacting spheres with different sizes and initial configurations.

We thank the authors for the effort in preparing their contributions and for meeting the special-issue deadlines. These contributions will certainly help advance computational FSI.

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## Reference

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