

COMPUTATIONAL FLUID MECHANICS WITH FREE AND MOVING BOUNDARIES: METHODS AND APPLICATIONS

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REKHA RAO,^{*} DAVID NOBLE,^{*} ELIE HACHEM[†]
AND KRISTIANTO TJIPTOWIDJOJO[#]

^{*} Sandia National Laboratories
PO Box 5800, MS0836, Albuquerque, NM 87185-0836, USA
rrao@sandia.gov and drnoble@sandia.gov

[†] MINES ParisTech
1 rue Claude Daunesse BP 207 06904, Sophia Antipolis, France
elie.hachem@mines-paristech.fr

[#] University of New Mexico
MSC04 2790 Albuquerque, NM 87131-0001, USA
tjiptowi@unm.edu

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ABSTRACT

Many problems in computational mechanics involve one or more boundaries that are interfaces between different materials, including fluid-fluid, solid-solid, or fluid-solid. Problems in this class present many difficulties for numerical solution techniques since they introduce moving boundaries and consequently evolving geometries whose location and topology is unknown a priori. In this Minisymposium, we will provide a forum for researchers to meet and share ideas and experiences in this challenging area of computational mechanics. We seek submissions on all aspects of this problem: theory, formulation, analysis, and applications. Presentations including numerical verification and experimental validation are encouraged. We also encourage papers on manufacturing flows and flows with free surface flows with non-Newtonian fluids.

Methods include, but are not limited to: Level set and volume-of-fluid, arbitrary-Lagrangian-Eulerian (ALE) methods, immersed boundaries, sharp and diffuse modeling of interfacial zones, deformed geometry remeshing, fictitious domain methods, particle methods, embedded boundary conditions, Cut mesh methods

Applications include, but are not limited to: 1) Manufacturing flows 2) Fluid-solid interactions 3) Multiphase flow 4) Dynamics reaction fronts 5) Low capillary flows 6) Surface tension formulations 7) Interfacial mass transfer 8) Melt/solidification front modeling 9) Bubble and suspension dynamics 10) Mold filling 11) Dynamic wetting lines 11) Suspension and emulsion rheology 12) Polymer extrusion and mixing