MULTI-PHYSICS SIMULATIONS
WITH THE COUPLING LIBRARY PRECICE

BENJAMIN UEKERMANN\textsuperscript{*} AND MIRIAM MEHL\textsuperscript{†} AND Gerasimos
CHOURDAKIS\textsuperscript{×}

\textsuperscript{*} Department of Mechanical Engineering, Eindhoven University of Technology
PO Box 513 - 5600 MB Eindhoven, The Netherlands
e-mail: b.w.uekermann@tue.nl, web page: https://www.tue.nl

\textsuperscript{†} Institute for Parallel and Distributed Systems, University of Stuttgart
Universitätstr. 38, 70569 Stuttgart, Germany
e-mail: miriam.mehl@ipvs.uni-stuttgart.de, web page: https://www.ipvs.uni-stuttgart.de

\textsuperscript{×} Scientific Computing in Computer Science, Technical University of Munich
Boltzmannstr. 3, 85748 Garching, Germany
e-mail: chourdak@in.tum.de, web page: https://www5.in.tum.de/

Key words: Multiphysics, Coupled Problems, Co-Simulation, Fluid-Structure Interaction, Multiscale

ABSTRACT

preCICE is an open-source coupling library for partitioned multi-physics simulations. It enables the efficient, robust, and parallel coupling of separate single-physics solvers. This includes, but is not restricted to fluid-structure interaction. preCICE treats these solvers as black-boxes and, thus, only minimally-invasive changes are necessary to prepare a solver for coupling. Thus, existing sophisticated solvers can be used for each of the physics in a multi-physics simulation. Ready-to-use adapters for well known commercial and open-source solvers, including OpenFOAM, SU2, CalculiX, FEniCS, and ANSYS Fluent, are available. The software offers methods for equation coupling, fully parallel communication, and data mapping schemes.

The minisymposium brings together users and developers of the software. It enables the exchange of academic and industrial users among themselves, which otherwise would not know much of each other. Furthermore, the developer team can get direct feedback from the users, who they sometimes only know from mailing list conversations. Last, the software and its capabilities can be presented to others in a full and broad sense as not only the developers talk about their software, but also users report on experiences.

REFERENCES