The 8th European Congress on Computational Methods in Applied Sciences and Engineering
ECCOMAS Congress 2022
5-9 June 2022, Oslo, Norway

Parallel time-stepping for fluid-structure interactions

Nils Margenerg[1], **Thomas Richter**[2]

[1] Helmut Schmidt Universität Hamburg, Postfach 70 08 22, 22008 Hamburg,
margenbn@hsu-hh.de
[2] Otto-von-Guericke Universität Magdeburg, Universitätsplatz 2, 39106 Magdeburg,
thomas.richter@ovgu.de

Keywords: *Fluid-solid interactions, parallel time stepping*

We present a parallel time-stepping method for fluid-structure interactions. The interaction between the incompressible Navier-Stokes equations and a hyperelastic solid is formulated in a fully monolithic framework. Discretization in space is based on equal order finite element for all variables and a variant of the Crank-Nicolson scheme is used as second order time integrator. To accelerate the solution of the systems, we analyze a parallel-in time method. For different numerical test cases in 2d and in 3d we present the efficiency of the resulting solution approach.

It turns out that fluid-structure interactions are not well amenable to parallel time-stepping methods. We therefore discuss some pitfalls and difficulties we have encountered with this approach.

REFERENCES

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