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# A PARTITIONED COUPLING ENVIRONMENT FOR MULTI-PHYSICS PROBLEMS INVOLVING COMPRESSIBLE MATERIALS

**PATRICK ERBTS*, STEFFEN ROTHE†, ALEXANDER DÜSTER*, STEFAN HARTMANN†**

*Numerical Structural Analysis with Application in Ship Technology,
Hamburg University of Technology, Schwarzenbergstr. 95 C, 21073 Hamburg, Germany
corresponding author:patrick.erbts@tuhh.de, www.tuhh.de/skf

†Institute of Applied Mechanics, Clausthal University of Technology
Adolph-Roemer-Str. 2a, 38678 Clausthal-Zellerfeld, Germany

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We present a partitioned coupling environment for the numerical treatment of multi-physics problems which also allows to take the behavior of highly compressible materials into account. The interaction of such materials with other physical fields arises in several industrial applications and its numerical simulation is a challenging issue. In this presentation, we consider a complex three-field problem, namely the electro-thermo-mechanical modelling of the field-assisted sintering technology. This process involves the compaction of highly compressible powder at high temperatures and heating rates coming from an electrical field. The simulation of this process calls for a stable and efficient coupling procedure which will be discussed during the presentation.

A partitioned approach is employed to solve the entire problem offering high flexibility and computational efficiency. It can be used to connect different solvers and to apply different spatial as well as temporal discretization schemes. The drawback of only conditional stability is attenuated by using external stabilization algorithms. Moreover, we take advantage of the flexibility of the approach and integrate another solver to determine the influence of radiative heat transfer. In other words, the three-field problem is extended to four fields so that thermal radiation of the field-assisted sintering process can be covered. The coupling environment is implemented in a fashion that guarantees a consistent data transfer between the solvers and that can also handle the large deformations of the powder material.