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NONSTANDARD METHODS FOR HIGHLY NONLINEAR PROBLEMS

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ROLF KRAUSE[1], MARTIN WEISER[2], GABRIEL WITTUM[3]

1 Institute for Computational Science
Università della Svizzera italiana
Via G. Buffi 13
6900 Lugano
Switzerland
rolf.krause@usi.ch, ics.usi.ch

2 Zuse Institute Berlin
Takustr. 7
14195 Berlin
Germany
weiser@zib.de, www.zib.de/weiser
– corresponding organizer –

3 AMCS, KAUST
King Abdullah University of Science and Technology
GCSC
University of Frankfurt
wittum@techsim.org

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ABSTRACT

Highly nonlinear or discontinuous and possibly coupled problems in mechanics and biomechanics, in particular contact, fracture, and fluid-structure interaction, are both relevant in many practical examples and computationally challenging. Thus, they are subject of ongoing and active research efforts despite decades of development. New and advanced discretization and solution methods have been invented over the last years, belonging to a wide variety of classes such as phase field, cut finite element, and enriched finite volume methods, or meshless and overconstrained formulations. These new approaches promise to overcome some drawbacks of existing ones.

On the other hand, their relative newness requires careful investigation of their mathematical properties and of their practical behavior when applied to realistic and complex problems. Existing methods, e.g., fast solution methods such as multigrid, have to be adapted to non-standard discretizations. The same holds true for the related simulation software, which needs to be extended in order to cope with the new developments.

This minisymposium is therefore intended to provide a discussion forum for all aspects of non-standard approaches, their mathematical properties, their practical behavior, and the related changes in (community) simulation tools. It aims at giving an overview of current

trends for highly nonlinear and coupled problems in mechanics in the broadest sense, and intends to provide a platform for exchange and combination of new ideas that have emerged in different research fields. In particular it shall gather researchers involved in new discretization and solver developments in these areas, fostering collaboration and community building.

Contributions related to any new algorithmic developments will be considered. Of particular interest is the treatment of coupled problems, their discretization and efficient solution. Speakers ill be encouraged to present both, success stories and failures, improving the understanding of algorithmic benefits from both sides. Failure stories will be of particular interest if they provide insight into the failure mechanisms and conditions.

We aim at a MS size of two sessions, and envisage two keynote talks.