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HIGH PERFORMANCE COMPUTING WITH SPACE-TIME METHODS

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ABSTRACT

Space-time methods are characterized by a uniform view on space and time, meaning the time direction is treated as an additional spatial coordinate. Recent years have seen very active research on various space-time discretization techniques, such as finite volume and finite element methods, continuous and discontinuous Galerkin methods, boundary element methods, and isogeometric analysis. We witness a growing mathematical understanding of space-time methods and the application of these methods to a variety of PDEs. The time-dependent problems being solved stem from many fields of science and engineering, such as fluid and structural dynamics, geophysics, magnetics, biology.

This mini-symposium addresses specifically high performance computing aspects of space-time methods. Monolithic space-time discretizations have several advantages that can be exploited to gain computational efficiency. The increased system size in comparison to conventional methods with a separate discretization of space and time domain offer a way to increase parallelism as a form of parallel-in-time computations. Moreover, space-time discretization techniques allow to transfer known spatial methods into the entire space-time domain, e.g., adaptive mesh refinement or mesh-based model order reduction (MOR) techniques for transient problems.

Inspired by these advantages, we intend to bring together experts in the field of space-time methods and high performance computing to foster scientific exchange and collaboration in stimulating innovative research.