



Lothar-Collatz-Kolloquium für Angewandte Mathematik

Donnerstag, den 08. Juni 2023, um 17:15 Uhr, im Hörsaal 5

Prof. Dr. Ilaria Perugia*
(University of Vienna, Faculty of Mathematics)

"Space-time virtual elements for the heat equation"

Zusammenfassung/Abstract:

Space-time methods, as opposed to time-marching schemes, are based on variational formulations of the considered time-dependent problems in both space and time. Advantages of this monolithic approach are that high-order approximations both in space and time are simple to obtain, simultaneous local refinement in space and time is possible, and the numerical solution is available at all times.

In this talk, we present a space-time virtual element method for the approximation of the heat equation. The considered meshes are tensor products of polytopic meshes in space and interval partitions in time. Local test and trial functions are defined as solutions to a heat problem with polynomial data. Global approximation spaces are constructed in a nonconforming fashion. This allows for an analysis setting and an implementation strategy, which are independent of the spatial dimension. As typical of the virtual element framework, the basis functions are not known in closed form. The method is therefore defined in terms of degrees of freedom only, with the help of suitable local projections onto underlying space-time polynomial spaces. Theoretical results, as well as their numerical validation, will be discussed.

These results have been obtained in collaboration with Sergio Gómez, Lorenzo Mascotto, and Andrea Moiola.

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