Doctorate School PLUS

uni-salzburg.at/doktorat

PARIS LODRON UNIVERSITÄT SALZBURG

MARS

Models, Algorithms, Computers and Systems

Series of Talks
WS 2025/26

Start: 3.00 pm

Location: Lecture room 414, 1st floor
Hellbrunner Straße 34

A cooperation with SMC

Department of Mathematics
Department of Computer Science

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PARIS LODRON UNIVERSITÄT SALZBURG | Mathematics

PARIS LODRON UNIVERSITÄT SALZBURG | Computer Science

MARS – Models, Algorithms, Computers, and Systems

Modern high tech research in science and technology requires to a great extent an interdisciplinary approach. This applies particularly to wide areas of the methodological sciences mathematics and computer science, where generally one or more aspects of a chain of consecutive closely interlocked fields of research are considered. These start with a mathematical model, continue with algorithmic problems and finally cover aspects of the implementation on computers or high performance computing environments and therefore also issues on the efficiency of computer systems.

MARS is a doctoral programme at the Doctorate School PLUS (DSP Programme), which is organized by the departments of mathematics and computer sciences of the Paris Lodron University Salzburg. Its objective is to educate doctoral students in the research fields models, algorithms, computers, and systems and also to achieve new insights and research findings especially with regard to the inter-dependency of these fields of research. The focus will be on important topics relevant for the Salzburg research site. MARS fields of research form particularly from a methodological point a cohesive and closely linked line of research and cover a wide spectrum of scientific interests.

Joint activities constitute the structured doctoral program in MARS. These include seminars with external guest speakers, one day workshops with external guests and multi day retreats away from the university, as well as summer schools on the topics of MARS.

Program

January 22, 2026
Thursday, 3:00 pm
Lecture Hall 414, 1st floor
High order finite elements and geometric models – A long story with surprising twists and turns
Ernst Rank (Munich TUM)

High-order finite element methods offer excellent accuracy and efficiency - provided that the geometry of the computational domain is precisely discretized. This requirement places high demands on mesh generation, which can only be met by specialized techniques with often laborious user interaction.

This limitation has long hindered a wider application of high-order FEM in engineering practice. As surprising alternative for precise meshing, high-order immersed boundary methods have been developed,which do not meet the domain's boundary at all. Instead, the physical domain is embedded in a larger grid-like mesh, and the geometric model is only preserved on the level of element integration.

It will be shown in this presentation that the 'variational crime' committed by this embedding can efficiently be controlled and all favorable properties of high-order FEM be restored.

Coming...

Peter Topping (University of Warwick)
Curve shortening flow - old and new January 29, 2025