

Contact

Department of Mathematics
University of Salzburg
5020 Salzburg, Austria

E-Mail: andrea.baumgartner@sbg.ac.at

<http://www.uni-salzburg.at/index.php?id=205304&L=1>



MARS

Models, Algorithms, Computers and Systems

Kick-Off-Meeting
20.12.2016

Start: 3 pm

Location: HS 411, 1st floor
Faculty of Natural Sciences

A workshop of the doctoral programme MARS

Department of Mathematics
Department of Computer Science
University of Salzburg

MARS Models	MARS Algorithms	MARS Computers	MARS Systems
Partial Differential Equations, Variational problems	Finite Element Methods (FEM)	Efficient (Parallel) FEM-Implementation on HPC-Environment	Scalability of FEM
Discrete Models	Algorithms of Discrete Mathematics, Algorithmic Number Theory	Efficient Implementation of Discrete Algorithms (on HPC-Environments)	Scalability of Discrete Algorithms
Dynamic Networks	Load Balancing Algorithms	Efficient (Parallel) Implementation of Load Balancing Algorithms	Scalability of Load Balancing Algorithms
Data Models	Complexity Results for Requests	Parallel and/or Distributed Implementation of Access Paths	Integration into Scalable Database Systems

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 informatics, 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 University of 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 interdependency of these fields of research. The focus will be on important topics relevant for the Salzburg research site. MARS fields of research (see below) form particularly from a methodological point a cohesive and closely linked line of research and cover a wide spectrum of scientific interests. The members of the support team from the departments of mathematics and computer science are without exception methodical and due to their fundamental formal science approach are able to work closely together on the research proposal of the doctoral programme.

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. The **kick-off-meeting** is the first event and will provide information about the aims, organization and contents of the doctorate school (DSP) and provide an overview of the research fields and theses of the supervisors and doctoral students involved.

MARS Models. The focus is on two model classes: analytical models, which are described by partial differential equations and the problems of variational calculus or its discretization in terms of the numerical solution process, and discrete models, which are presented in form of graphs, algebraic structures or difference equations.

MARS Algorithms. The investigation of numerical algorithms for the solution of discretization of partial differential equations, and algorithms for the solution of discrete and integer problems, in particular algorithms for large parallel and distributed dynamic systems.

MARS Computers. The main focus is on strategies for the parallel implementation of algorithms on modern computers or high performance computing environments, in particular on the systems set up for the Salzburg University computing environment Hochleistungsrechnen PLUS.

MARS Systems. The aim in the MARS systems field of research is to implement scalability regarding typical MARS specific applications from MARS models, MARS computers and MARS algorithms for increasingly powerful hardware.

Program

15:00-15:10 Introduction

MARS – Models, Algorithms, Computers and Systems. Univ.-Prof. Dr. Andreas Schröder

15:10-16:00 Research fields of the associated supervisors

Partial differential equations and calculus of variation. Univ.-Prof. Dr. Verena Bögelein

Diophantine analysis
Univ.-Prof. Dr. Clemens Fuchs

Discrete mathematics and metric number theory
Ao.Univ.-Prof. Dr. Peter Hellekalek

Diophantine equations and algebraic number theory
Ass.-Prof. Dr. Volker Ziegler

Numerical methods for partial differential equations
Univ.-Prof. Dr. Andreas Schröder

Parallel and distributed algorithms
Univ.-Prof. Dr. Robert Elsässer

Coalgebras, Probabilistic Systems, Concurrency Semantics. Ass.-Prof. Dr. Ana Sokolova

Data-centric applications in database and information systems. Univ.-Prof. Dr. Nikolaus Augsten

16:00-16:15 Break

16:15-17:40 Theses topics

Doubly nonlinear parabolic equations with measure data. Stefan Sturm, MSc

Composition of polynomials, lacunarity and linear recurrences. Mag. Christina Karolus, MSc

Number-theoretic problems in cryptographic applications. Markus Hittmeir, MSc

Diophantine problems related to linear recurrences
Dipl.-Ing. Christoph Hutle

Error control and adaptivity for fictitious domain methods. Dipl.-Ing. Paolo Di Stolfo

Numerical methods for variational inequalities and coupled systems. Dipl.-Math. Gregor Milicic

Non-conforming hp-finite element methods for variational equation and inequalities
Dipl.-Math. Jan Petsche

Analysis and modelling of real networks
Andreas Bilke, MSc

Algorithms for (convex) behavioural semantics of probabilistic systems. Dipl.-Ing. Sebastian Arming

Multicore-scalable parallelization of tree edit distance on shared memory machines
Alireza Abyaneh, MSc

Performance analysis of concurrent memory management systems. Ouafae Lachhab, MSc

17:40-17:45 Closing discussion