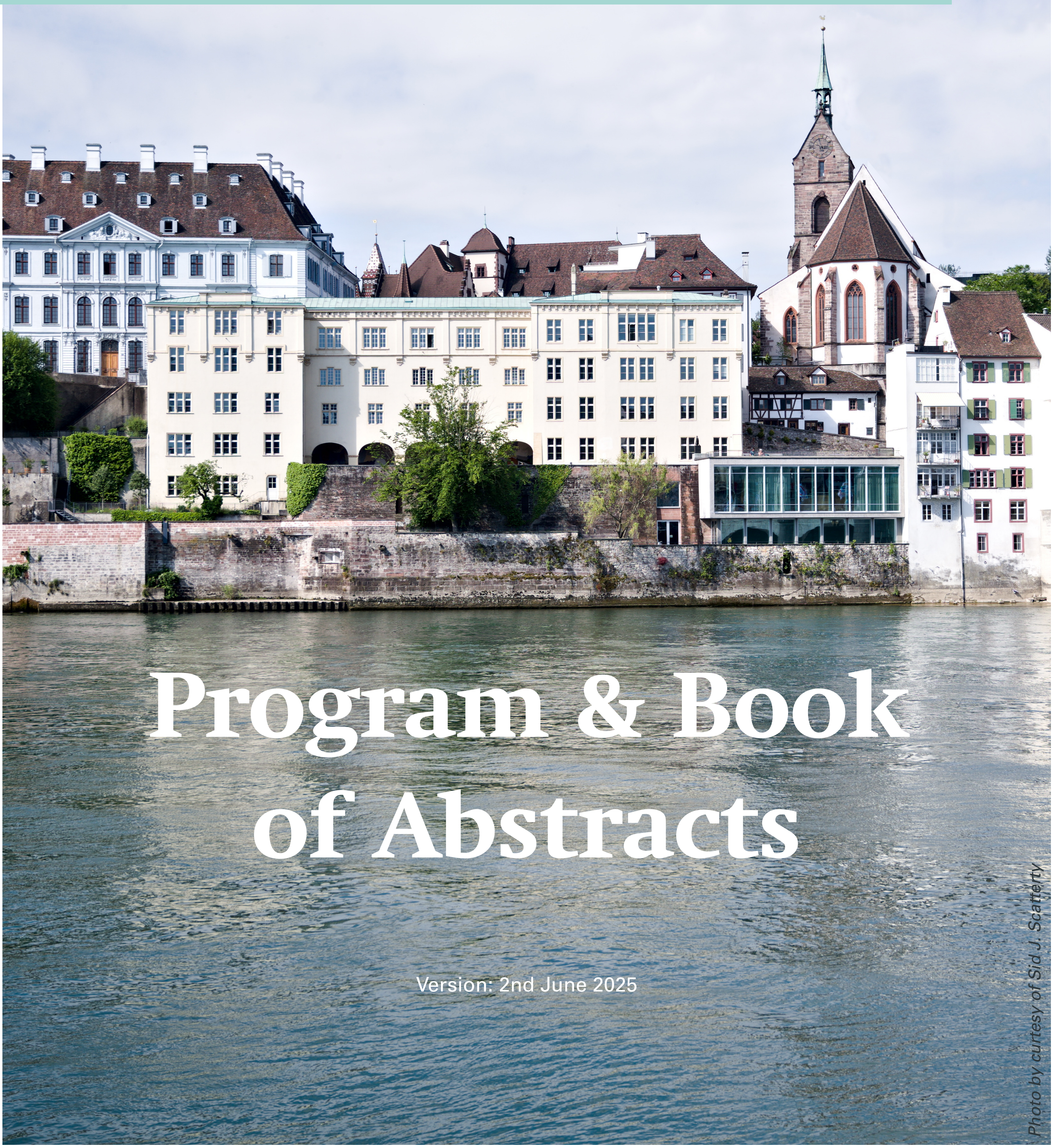
Universität Basel

Department of
Mathematics and Computer Science

Swiss Numerical Analysis Day 2025

Tuesday, 3rd June 2025



Program & Book of Abstracts

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Program

	Hörsaal 102	
	Hörsaal 102	Hörsaal 001
09:00 – 10:00	**Registration and Welcome Coffee**	
10:00 – 11:10	**Opening and First Plenary Talk** *Solving Inverse Problems Without Using Forward Operators* Barbara Kaltenbacher (University of Klagenfurt)	
11:15 – 12:15	**Session 1**	
	Sara Avesani: *Multiscale Scattered Data Approximation in Samplet Coordinates*	Jörg Nick: *The Temporal Domain Derivative in Inverse Acoustic Obstacle Scattering*
	Thomas Trigo Trindade: *Dynamical Low-Rank Kalman Filtering*	Andrea Angino: *Data-Magical Trust Region (DMTR): A Multi-Fidelity Optimization Strategy for Neural Network Training*
	Giacomo Elefante: *Polynomial Interpolation from Integral Data*	Chiara Segala: *Moment-Driven Predictive Control of Mean-Field Collective Dynamics*
12:15 – 13:30	**Lunch**	
13:30 – 14:10	**Session 2**	
	Florian Spicher: *Optimal FEM for Semilinear PDE with Subcritical Reactions*	Mahdieh Arezoomandan: *Numerical Approximation of Stochastic Partial Differential Equations with Fractional Brownian Motion*
	Philipp Weder: *Analysis-Aware Defeaturing of Dirichlet Features in Poisson Problems*	Benedikt Gräßle: *Stable Integral Equations for Acoustic Transmission in Rough Media*
14:20 – 15:00	**Session 3**	
	Bastien Chaudet-Dumas: *Optimizing the Space-Time Multigrid Algorithm*	Nikita Afanasev: *Active Flux Methods on a Sphere*
	Jingrong Yang: *Optimal Prolongation and Restriction Operators for Space-Time Multigrid Methods*	Markus Renoldner: *Analysis and Numerical Analysis of Alfvén Wave Equations*
15:00 – 15:45	**Poster Session and Coffee Break**	
15:45 – 16:45	**Second Plenary Talk and Closing** *Navier-Stokes Equations on Surfaces: Analysis and Numerical Simulations* Arnold Reusken (RWTH Aachen University)	

Abstracts

Plenary Talks

Solving Inverse Problems Without Using Forward Operators

Barbara Kaltenbacher (University of Klagenfurt)

Inverse problems generally speaking determine causes for desired or observed effects, which has numerous applications ranging from medical imaging via non-destructive testing to seismic prospection. Computational methods for solving inverse problems usually rely on some kind of inversion of the mentioned cause-to-effect map, which is also called forward operator.

However, this forward operator is often compuationally quite expensive to evaluate or might even not be well-defined. In such cases it can help a lot to take a different viewpoint and consider the inverse problem as a system of model and observation equations, with both the state of the system and the searched for parameter as unknowns. Besides such an all-at-once approach, even more generally, reformulation of the inverse problem as an optimization task rather than a (system of) equation(s) allows to avoid the use of a forward operator.

A crucial aspect in the computational solution of inverse problems is their ill-posedness in the sense that small perturbations in the given observations can lead to large deviations in the reconstructions. To overcome this issue, regularization methods need to be employed and we will discuss the application and adoption of several regularization concepts to all-at-once and minimization based formulations, in contrast to classical reduced ones.

Navier-Stokes Equations on Surfaces: Analysis and Numerical Simulations

Arnold Reusken (RWTH Aachen University)

In this presentation we consider a Navier-Stokes type system, posed on a smooth closed stationary or evolving two-dimensional surface embedded in three dimensional space. We briefly address modeling aspects related to this system. We introduce the so-called tangential surface Navier-Stokes equations and discuss a well-posed weak variational formulation of this PDE system that forms the basis for finite element discretization methods. Furthermore we explain the basic ideas of an unfitted finite element method, known as TraceFEM, that is used in our numerical simulation of the tangential surface Navier-Stokes system. Results of numerical experiments with this method are presented that illustrate how lateral flows are induced by smooth deformations of a material surface.

Contributed Talks

Multiscale Scattered Data Approximation in Samplet Coordinates

Sara Avesani (Università della Svizzera Italiana)

The talk is based on joint work with: M. Multerer (USI), R. Kempf (University of Bayreuth), and H. Wendland (University of Bayreuth).

We study multiscale scattered data interpolation schemes for globally supported radial basis functions with focus on the Matérn class. The multiscale approximation is constructed through a sequence of residual corrections, where radial basis functions with different lengthscale parameters are combined to capture varying levels of detail, as introduced in [1]. We prove that the condition numbers of the diagonal blocks of the corresponding multiscale system remain bounded independently of the particular level, allowing us to use an iterative solver with a bounded number of iterations for the numerical solution. To apply the multiscale approach to large data sets, we suggest to represent each level of the multiscale system in samplet coordinates. Samplets are localized, discrete signed measures exhibiting vanishing moments and allow for the sparse approximation of generalized Vandermonde matrices issuing from a vast class of radial basis functions, see [2]. Given a quasi-uniform set of N data sites, and local approximation spaces with exponentially decreasing dimension, the samplet compressed multiscale system can be assembled with cost $O(N \log^2 N)$.

[1] H. Wendland. Multiscale analysis in Sobolev spaces on bounded domains. *J. Numer. Math.*, 116:493–517, 2010, Springer.

[2] H. Harbrecht, and M. Multerer. Samplets: Construction and scattered data compression. *J. Comput. Phys.*, 471:111616, 2022, Elsevier.

Dynamical Low-Rank Kalman Filtering

Thomas Trigo Trindade (EPFL)

The talk is based on joint work with: F. Nobile (EPFL).

Data Assimilation consists in combining one's model knowledge with a stream of data in order to improve the prediction of the system state. Two successful outlets of that approach are given by the Kalman-Bucy filter and its particle-based analog, the Ensemble Kalman filter. While the former describes the exact filtering density evolution in the case of linear and Gaussian dynamics, in practice the latter is often used in real-world applications such as climate or geosciences, as it is computationally tractable and applicable to non-linear settings. Despite the intrinsic low-rank structure many real-life systems seem to present, using a small number of particles might lead to significant Monte-Carlo error and stochastic fluctuations. We propose a principled model order reduction of the Kalman-Bucy filter (KBF) by way of the Dynamical Low-Rank (DLR) Approximation method, mimicking a time-evolving truncated Karhunen-Loeven approximation of the filtering density. In essence, leveraging the low-rank structure of the filtering density allows to evolve (an approximation of) it in a dynamically evolving subspace, at reduced computational cost. Under certain assumptions, our framework preserves well-known properties of the KBF (including mean and covariance characterisation), and we also establish error bounds between the true and reduced order model. We also propose a DLR extension of the Ensemble Kalman filter, and show a propagation of chaos property to its rank-reduced mean-field limit. Numerical results confirm the predicted properties and the effectiveness of the method.

[1] F. Nobile, T. Trigo Trindade. *Dynamical Low-Rank Kalman Filtering*, (in preparation).

Polynomial Interpolation from Integral Data

Giacomo Elefante (Università della Svizzera Italiana)

The talk is based on joint work with: L. Bruni Bruno (University of Padova).

This work focus on polynomial interpolation with data collected as integral on compact regions instead of single points. We investigates conditions that ensures the existence and uniqueness of solutions, demonstrating that the position of these regions play a key role for well-posedness.

We, then, analyze the stability of this method, deriving a Lebesgue constant-like quantity. After analyzing some of its features, such as invariance properties and sensitivity to support overlapping, we numerically verify the theoretical findings.

The Temporal Domain Derivative in Inverse Acoustic Obstacle Scattering

Jörg Nick (ETH Zürich)

The talk is based on joint work with: M. Knöller (University of Helsinki).

The talk discusses the domain derivative for a time-dependent acoustic scattering problem. We study the nonlinear operator that maps a sound-soft scattering object to the solution of the time-dependent wave equation evaluated at a finite number of points away from the obstacle. The Fréchet derivative of this operator with respect to variations of the scatterer coincides with point evaluations of the temporal domain derivative. The latter is the solution to another time-dependent scattering problem, for which a well-posedness result is shown under sufficient temporal regularity of the incoming wave. Applying convolution quadrature to this scattering problem gives a stable and provably convergent semi-discretization in time, provided that the incoming wave is sufficient regular. Using the discrete domain derivative in a Gauss–Newton method, we describe an efficient algorithm to reconstruct the boundary of an unknown scattering object from time domain measurements in a few points away from the boundary. Numerical examples for the acoustic wave equation in two dimensions demonstrate the performance of the method.

[1] M. Knöller and J. Nick The temporal domain derivative in inverse acoustic obstacle scattering, *SAM Research Report,* 2024.

Data-Magical Trust Region (DMTR): A Multi-Fidelity Optimization Strategy for Neural Network Training

Andrea Angino (UniDistance Suisse)

In recent years, multi-fidelity optimization has gained significant attention, particularly in areas characterized by complex and expensive objectives, such as neural network training.

This work presents a novel adaptation of the Magical Trust Region (MTR) method, termed Data-Magical Trust Region (DMTR), which can be applied broadly in settings where a dataset is available and feature extraction is feasible; neural network training is considered as one representative application. The distinctive feature of this approach lies in a secondary search direction that exploits a computationally efficient surrogate of the full objective function.

Unlike methods that rely solely on mini-batch evaluations of the loss, this direction is constructed through a feature extraction process applied to the dataset, which serves as the basis for the surrogate model. This enables the algorithm to capture relevant structural information cost-efficiently. As a result, the method enhances both the adaptability and the effectiveness of the optimization process during classifier training. We demonstrate the performance of DMTR across several datasets, highlighting consistent improvements over standard optimization strategies.

Moment-Driven Predictive Control of Mean-Field Collective Dynamics

Chiara Segala (Università della Svizzera Italiana)

The talk is based on joint work with: G. Albi (University of Verona), M. Herty (RWTH Aachen University), and D. Kalise (Imperial College London).

We address the problem of designing feedback control strategies for large-scale systems of interacting agents governed by nonlinear collective dynamics. Starting from a classical agent-based model with nonlocal interactions, we consider its mean-field limit and propose a methodology that combines linearization techniques with the solution of matrix Riccati equations to obtain suboptimal feedback controls. These are embedded in a nonlinear model predictive control framework, where control updates are driven by macroscopic quantities—in particular, the first and second moments of the agent distribution.

Our approach circumvents the computational challenges associated with synthesizing optimal feedback laws for high-dimensional nonlinear systems, such as the intractability of the Hamilton–Jacobi–Bellman equation. Instead, we construct a feedback law for a suitably linearized mean-field model, and iteratively update it using dynamic information about the evolution of the moments. This yields a control strategy that is efficient, scalable, and robust to partial observations of the system state.

We provide theoretical performance estimates that guide the choice of linearization points and control update frequency. Numerical experiments demonstrate the effectiveness of our method in stabilizing self-organizing dynamics, with applications ranging from opinion formation to alignment in collective motion.

[1] G. Albi, M. Herty, D. Kalise, and C. Segala. Moment-Driven Predictive Control of Mean-Field Collective Dynamics. *SIAM Journal on Control and Optimization*, 60(2):814–841, 2022.

[2] G. Albi and L. Pareschi. Binary interaction algorithms for the simulation of flocking and swarming dynamics. *Multiscale Modeling & Simulation*, 11:1–29, 2013.

[3] M. Herty, L. Pareschi, and S. Steffensen. Mean–field control and Riccati equations. *Networks and Heterogeneous Media*, 10:699–715, 2015.

Optimal FEM for Semilinear PDE with Subcritical Reactions

Florian Spicher (Universität Bern)

The talk is based on joint work with: Thomas P. Wihler (Universität Bern).

In this talk, we present a fully rigorous and implementable finite element framework for solving semilinear elliptic boundary value problems

$$-\Delta u + g(\cdot, u) = f \quad \text{in } \Omega \subset \mathbb{R}^2, \qquad u|_{\Gamma_{\mathcal{D}}} = 0,\ \partial_{\boldsymbol{n}} u|_{\Gamma_{\mathcal{N}}} = 0,$$

where $f \in \mathrm{L}^p(\Omega)$ $(1 < p < \infty)$ and the nonlinearity g is continuously differentiable, monotone and its derivative exhibits exponential growth.

The focus of our presentation is on an optimal a priori error estimate for a contractive Picard type iteration scheme on meshes that are locally refined towards possible corner singularities in polygonal domains. Our analysis involves, in particular, an elliptic regularity result in weighted Sobolev spaces and the use of the Trudinger inequality, which is instrumental in dealing with subcritically growing nonlinearities.

[1] F. Spicher and T. P. Wihler. *Optimal finite element approximations of monotone semilinear elliptic PDE with subctitical nonlinearities*, 2025. *arXiv preprint*, arXiv:2504.11292.

Analysis-Aware Defeaturing of Dirichlet Features in Poisson Problems

Philipp Weder (EPFL)

The talk is based on joint work with: A. Buffa (EPFL).

Geometry simplification, or defeaturing, is essential for industrial simulations. Defeaturing not only simplifies the meshing process, but also lowers the computational cost of the subsequent simulation since it reduces the number of degrees of freedom. Standard defeaturing methods typically use geometric criteria, ignoring the problem's physics. Analysis-aware defeaturing addresses this through a posteriori error estimation, combining the defeatured simulation output and the exact geometry information to guide the defeaturing process.

Let $\Omega \subset \mathbb{R}^n$, $n \in \{2, 3\}$ be the exact domain and $\Omega_0 \supset \Omega$ its defeatured version. Let $u \in V$ and $u_0 \in V_0$ be solutions to a PDE on Ω and Ω_0 in suitable Hilbert spaces V and V_0, respectively. The defeaturing error $e := u - (u_0)_{|\Omega}$ is estimated via $||e||_V \leq C\mathcal{E}(u_0)$, where $C > 0$ is a constant independent of the feature size.

A rigorous framework was introduced in [1] for the Poisson problem and extended to linear elasticity and Stokes flow in [2]; for a comprehensive overview of the topic see [3]. However, existing work assumes Neumann boundary conditions on features and only quantifies the defeaturing error in terms of the energy norm associated with the PDE problem.

We present reliable *a posteriori* estimators for the Poisson problem with *Dirichlet* conditions on negative interior or boundary features (γ). We establish reliability for the estimators in terms of the energy norm depending on the boundary conditions and geometry:

$$\begin{aligned}
\mathcal{E}_{\mathrm{DD}}(u_0) &:= \sqrt{2||d_\gamma||_{0,\gamma}||\nabla_t d_\gamma||_{0,\gamma}}, \\
\mathcal{E}_{\mathrm{DN}}(u_0) &:= \sqrt{2||d_\gamma||_{0,\gamma} - \overline{d_\gamma}^{\gamma}\,||\nabla_t d_\gamma||_{0,\gamma}} + |\gamma|^{\frac{n-2}{2(n-1)}}|\overline{d_\gamma}^{\gamma}|, \\
\mathcal{E}_{\mathrm{int}}(u_0) &:= 2\sqrt{||d_\gamma||_{0,\gamma} - \overline{d_\gamma}^{\gamma}\,||\nabla_t d_\gamma||_{0,\gamma}} + \bar{c}_\gamma|\overline{d_\gamma}^{\gamma}|,
\end{aligned}$$

where $d_\gamma := e_{|\gamma}$ is the error trace on the feature boundary. Based on these error estimates in terms of the energy norm and the dual weighted residual method

(DWR) [4], we also derive reliable defeaturing estimates in terms of linear functionals of the solution u. Finally, we provide numerical examples in 2D and 3D to demonstrate the validity and efficiency of the proposed estimators.

[1] A. Buffa, O. Chanon, and R. Vázquez. Analysis-aware defeaturing: Problem setting and *a posteriori* estimation. *Mathematical Models and Methods in Applied Sciences*, 32(02):359–402, 2022.

[2] P. Antolín and O. Chanon. Analysis-aware defeaturing of complex geometries with Neumann features. *International Journal for Numerical Methods in Engineering*, 125(3):e7380, 2024.

[3] O. G. Chanon. *Adaptive analysis-aware defeaturing*. PhD thesis, EPFL, 2022.

[4] R. Becker and R. Rannacher. An optimal control approach to *a posteriori* error estimation in finite element methods. *Acta Numerica*, 10:1–102, 2001.

Numerical Approximation of Stochastic Partial Differential Equations with Fractional Brownian motion: Simulation and Optimal Convergence

Mahdieh Arezoomandan (Université de Genève)

The talk is based on joint work with: A. R. Soheili (Ferdowsi University of Mashhad).

Fractional Brownian motions (fBms) are important classes of stochastic processes, exhibiting unique properties such as self-similarity, long-range dependence, and non-Markovian behavior.These properties distinguish fBm from classical Brownian motions, introducing challenges that make their numerical treatment of stochastic equations more challenging.

In this talk, we investigate the numerical approach to stochastic parabolic equations driven by infinite dimensional fBms.To achieve this, we employ a finite element method for spatial discretization and a fully implicit backward Euler method for temporal discretization. Our main aim is to obtain optimal strong convergence error estimates in the mean-square sense, which is crucial for understanding the behavior and efficiency of the numerical schemes used in this context [1].

In addition, we will focus on the linear stochastic Cahn-Hilliard equation with fractional Brownian motions and present our findings for this specific case [2].

[1] M. Arezoomandan and A.R. Soheili, Finite element approximation of linearize stochastic Cahn-Hilliard equations with fractional Brownian motion. *Math. Comput. Simul.*, 215:122–145, 2024.

[2] M. Arezoomandan and A.R. Soheili. Spectral collocation method for stochastic partial differential equations with fractional Brownian motion. *J. Comput. Appl. Math.*, 389 :113369, 2021.

Stable Integral Equations for Acoustic Transmission in Rough Media

Benedikt Gräßle (Universität Zürich)

The talk is based on joint work with: R. Hiptmair (ETH Zürich) and S. Sauter (Universität Zürich).

A novel variational formulation of layer potentials and boundary integral operators generalizes their classical construction based on Green's functions. Unlike classical approaches, our method applies even when Green's functions are not explicitly available, such as for Helmholtz problems with rough (e.g., piecewise Lipschitz) coefficients. Wave-number explicit estimates and properties like jump conditions are obtained directly from the variational definition. This enables a nonlocal (integral) formulation of acoustic transmission problems in heterogeneous media. The well-posedness of the resulting boundary integral equations is inherited from the underlying partial differential equation. Our analysis treats general spatial dimensions and complex wave numbers simultaneously by imposing an artificial boundary and exploiting new insights into the associated Dirichlet-to-Neumann map.

Optimizing the Space-Time Multigrid Algorithm

Bastien Chaudet-Dumas (HES-SO Haute école spécialisée de Suisse occidentale)

The talk is based on joint work with: M. J. Gander (Université de Genève) and A. Pogozelskyte (Université de Genève).

For time-dependent problems, Parallel-in-Time (PinT) algorithms allow us to parallelize problems in the time dimension when space parallelization alone creates communication bottlenecks. Parareal and Multigrid Reduction-in-Time (MGRIT) are two examples of such PinT algorithms based on multigrid techniques, but they are not truly scalable since they coarsen the problem only in the time dimension.

We will focus on a more intrusive method: the Space-Time Multigrid algorithm with block-Jacobi relaxation introduced by Gander and Neumüller. This algorithm provides excellent scalability for parabolic problems up to millions of cores, while still being equally as fast as forward substitution on one core only.

We will show that the performance of this algorithm can be further improved by the optimization of the smoothing parameters. This will allow the algorithm to be up to twice as fast as the original one. Results will be presented for the heat equation discretized with Backward Euler.

Optimal Prolongation and Restriction Operators for Space-Time Multigrid Methods

Jingrong Yang (Université de Genève, Jilin University)

The talk is based on joint work with: Martin J. Gander (Université de Genève).

The performance of space-time multigrid methods is influenced not only by the smoother but also by the prolongation and restriction operators, as one can see from numerical results. This observation motivates our investigation to derive optimal prolongation and restriction operators, in the sense of leading to a direct solver, i.e. convergence in a single iteration. This is then followed by introducing approximations to specific components to enhance computational efficiency. By exploiting the structure of the temporal evolution equation, where information propagates only forward in time, and drawing inspiration from cyclic reduction methods for scalar ODEs, we derive exact prolongation and restriction operators. In this context, the transmission of information from the fine to the coarse grid and back can be viewed as a type of transmission condition, which is the core component of our methodology. We analyze the parallel computational complexity associated with various approximation strategies and compare our method with existing space-time multigrid approaches, such as those employing a Block Jacobi smoother and MGRIT. While our method shares similarities with these approaches, it also exhibits significant differences, which will be discussed in detail during the presentation.

Active Flux Methods on a Sphere

Nikita Afanasev (Universität Zürich)

The talk is based on joint work with: R. Abgrall (Universität Zürich).

In recent years, Active Flux method, first introduced by T. Eymann and P. Roe [1], has been adapted to solve many problems for hyperbolic systems of PDEs on orthogonal [2] and polygonal [3] meshes. Typically, in Active Flux two types of mesh variables are used: cell averages and point values at nodes and edges of the mesh (in 2D planar case). The evolution of cell averages is approximated with a finite volume scheme for conservative form of hyperbolic equations, and the evolution of point values is handled with a finite difference scheme for the characteristic form of equations. In such way, both conservative and characteristic nature of the equations is captured in the numerical method.

In this talk, we introduce the generalization of Active Flux method on triangular meshes [3] to hyperbolic problems on a sphere. For the finite volume part, we follow [4] to rewrite the fluxes using the tangent vectors instead of normals to get a geometry-compatible scheme. For the point values update part, we use local projections of spherical triangles [5] and introduce a quasi-polynomial reconstruction of mesh functions on planar projected triangles to find the gradients. Some tests for linear hyperbolic problems on a sphere are demonstrated. It is worth noting that the use of local projections allows to generalize this method to problems on an arbitrary manifold.

[1] W. Barsukow, J. Hohm, C. Klingenberg, P.L. Roe. The active flux scheme on Cartesian grids and its low Mach number limit. *J. Sci. Comput.* 81:594–622, 2019.

[2] T.A. Eymann, P.L. Roe. Active flux schemes. *AIAA*, 382, 2011.

[3] R. Abgrall, J. Lin and Y. Liu. Active flux for triangular meshes for compressible flows problems. *arXiv*, 2024.

[4] M. Ben-Artzi, J. Falcovitz and P. LeFloch. Hyperbolic conservation laws on the sphere. A geometry-compatible finite volume scheme. *Journal of Computational Physics*, 228:5650–5668, 2009.

[5] M. Baldauf. Discontinuous Galerkin solver for the shallow-water equations in covariant form on the sphere and the ellipsoid. *Journal of Computational Physics*, 410:109384, 2020.

Analysis and Numerical Analysis of Alfvén Wave Equations

Markus Renoldner (EPFL)

The talk is based on joint work with: A. Buffa (EPFL), T. Miehling (EPFL), M. Picasso (EPFL), and P. Ricci (EPFL).

Turbulence phenomena in plasma physics have recently attracted the interest of many researchers, due to its theoretical challenges as well as its pivotal role in fusion energy reserach. Shear Alfvén waves, described by a coupled system of partial differential equationss, capture the fastest oscillatory dynamics within the drift-reduced Braginskii equations.The latter model plasma fluids in high turbulence regimes subject to strongly anisotropic external forces, such as those in magnetic confinement fusion [1]. Our work addresses the well-posedness and numerical analysis of Alfvén waves. We first discuss their unintuitive dispersion relation. We prove existence, uniqueness and stability of weak solutions in the natural energy norm. In order to achieve this, we introduce anisotropic Sobolev spaces [2, 3], which constitute a natural setting for solutions to the Shear Alfvén wave equations. Additionally, we propose a Finite Element discretization and prove a priori error estimates and energy conservation properties. Numerical example computations are presented to validate our theoretical results.

[1] F.D. Halpern, P. Ricci, S. Jolliet, J. Loizu, J. Morales, A. Mosetto, F. Musil, F. Riva, T.M. Tran, C. Wersal. The GBS code for tokamak scrape-off layer simulations. *Journal of Computational Physics*, 315:388–408, 2016.

[2] J. Pousin, P. Azerad. Inégalité de Poincaré courbe pour le traitement variationnel de l'équation de transport. *Comptes Rendus de l'Académie des Sciences*, 322(1):1–6, 1996.

[3] A. Maione. Variational convergences for functionals and differential operators depending on vector fields. Thesis submitted to the University of Trento for the degree of Doctor of Philosophy, Department of Mathematics. *University of Trento*, October 2020. Supervisors: F. Serra Cassano and A. Pinamonti.

Posters

- **Enhancing Adaptive Rectangular Decomposition with Atmospheric Absorption Modeling**
  Gerardo Cicalese (Politecnico di Milano)
- **Network System Forecasting Despite Topology Perturbation**
  Ramzi Dakhmouche (EPFL)
- **Structure Preserving Implicit Richtmyer Scheme for Euler Equations**
  Federico Gatti (ETH Zürich)
- **The Modulus-Based Minimal Polynomial Extrapolation Method for Solving Linear Complementarity Problems**
  Siwei Liao (Université de Genève)
- **A Robust Spline-Based Hexahedral Mesh Generator for Patient-Specific Coronary Arteries**
  Fabio Marcinnò (EPFL)
- **Fokker-Planck Framework for Non-Equilibrium Gas Dynamics**
  Veronica Montanaro (EPFL)
- **Neural Galerkin Normalizing Flow for Bayesian Inference of Stochastic Volatility Models**
  Riccardo Saporiti (EPFL)
- **Recovery-Based Error Indicator for Finite Difference Methods**
  Ferhat Sindy (EPFL)
- **Multigrid Method for the Helmholtz Equation with Robin Boundary Condition**
  Yafei Sun (Université de Genève)
- **Truncated Floquet-Bloch Transform for Computing the Spectral Properties of Large Finite Systems of Resonators**
  Alexander Uhlmann (ETH Zürich)

- **Bayesian Optimisation Techniques for PDE-Constrained Optimisation Under Uncertainty**

  Eliott Van Dieren (EPFL)
- **FEM for Singularly Perturbed Stationary Drift-Diffusion Equations**

  Tianwei Yu (ETH Zürich)

Participants

- **Dr. Nikita Afanasev** Universität Zürich
- **Mr. Oussama Al Jarroudi** Universität Basel
- **Mr. Foivos Alimisis** Universität Basel
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- **Dr. Mahdieh Arezoomandan** Université de Genève
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- **Ms. Gaia Fumagalli** Università della Svizzera Italiana
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- **Mr. Nicolas Masson** Université de Genève
- **Dr. Philipp Mekler** Universität Basel
- **Mr. Herbst Michael** EPFL
- **Dr. Simon Michel** Universität Bern
- **Ms. Veronica Montanaro** EPFL
- **Dr. Gang Mu** Johnson & Johnson
- **Prof. Michael Multerer** Università della Svizzera Italiana
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- **Dr. Jörg Nick** ETH Zürich
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- **Ms. Anna Peruso** EPFL
- **Prof. Marco Picasso** EPFL
- **Mr. Jacopo Quizi** Università della Svizzera Italiana
- **Mr. Martin Ramm** Universität Basel

- **Mr. Markus Renoldner** EPFL
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- **Prof. Christoph Schwab** ETH Zürich, SAM
- **Dr. Chiara Segala** Università della Svizzera Italiana
- **Dr. Michel Fabrice Serret** PSI
- **Mr. Nian Shao** EPFL
- **Mr. Ferhat Sindy** EPFL
- **Mr. Florian Spicher** Universität Bern
- **Dr. Yafei Sun** Université de Genève
- **Mr. Clemens Thalhammer** ETH Zürich
- **Mr. Thomas Trigo Trindade** EPFL
- **Mr. Alexander Uhlmann** ETH Zürich
- **Mr. Eliott Van Dieren** EPFL
- **Mr. Gianfranco Verzella** Université de Genève
- **Mr. Remo von Rickenbach** Universität Basel
- **Mr. Philipp Weder** EPFL
- **Prof. Thomas Wihler** Universität Bern
- **Mr. Jingrong Yang** Université de Genève
- **Mr. Tianwei Yu** ETH Zürich
- **Dr. Li Zeng** EPFL