



29th Biennial Conference
on
Numerical Analysis

27 June - 30 June, 2023

Programme

Introduction

Dear Participant,

On behalf of the Strathclyde Numerical Analysis and Scientific Computing Group, it is our pleasure to welcome you to the 29th Biennial Numerical Analysis conference. This is the sixth time the meeting has been held at Strathclyde, continuing the long series of conferences originally hosted in Dundee. We are delighted to have over 200 registered participants from all over the world, some who are familiar faces at this series of meetings, but also many who are attending for the first time.

The conference is rather unusual in the sense that it seeks to encompass all areas of numerical analysis, and the list of invited speakers reflects this aim. We have once again been extremely fortunate in securing a top line-up of plenary speakers, and we very much hope that you enjoy sampling the wide range of interesting topics which their presentations will cover. The specialised minisymposia and sessions of contributed talks scheduled cover a wealth of additional areas, confirming the continued strength of numerical analysis as an active field of research almost 60 years since the first meeting in the series.

The meeting is funded almost entirely from the registration fees of the participants. However, we are very pleased to be able to subsidise the student registration fee and provide additional financial support for some overseas participants thanks to the Dundee Numerical Analysis Fund, started by Professor Gene Golub from Stanford University in 2007. We are also thankful to have again received sponsorship from the UKIE section of the Society for Industrial and Applied Mathematics for three prizes for the best student talks which, if past meetings are anything to go by, will be a very hard-fought competition!

Outwith the scientific content, we hope you will also enjoy meeting new people and socialising with the other participants. We are indebted to the City of Glasgow for once again generously sponsoring a wine reception in the spectacular City Chambers building: this will take place on Tuesday evening. Another social highlight will be our conference dinner on Thursday evening, which will be held in Òran Mór, another of Glasgow's impressive historic buildings. Welcome to Glasgow, and enjoy the meeting!

Gabriel R. Barrenechea
Philip Knight
Jennifer Pestana
Conference Organising Committee

NACONF 2023: Important information for participants

- **Information for speakers**

1. Speakers should go to the allocated room during the coffee or lunch break prior to their session to load their talk onto the conference laptop. Due to time constraints, use of personal laptops will not be permitted.
2. Each speaker has an allocated slot of 20 minutes. **Please do not exceed your allotted time.**
3. Student speakers should identify themselves to the chairperson at the beginning of the session (so they can be considered for the UKIE SIAM prize, see below).

- **Session chairs**

1. **Please check the final programme to see if you are listed as chairing a session.** If you are, we hope that you will be willing to help in this way.
2. Minisymposium organisers should organise chairpeople for their own sessions (including any contributed talks which follow) as appropriate.
3. Each speaker has an allocated slot of 20 minutes. After each talk, 5 minutes have been allowed for moving between rooms (this time may be used for questions, if required). **Please keep speakers to the timetable, and make sure the talks start at the right time.**
4. Session chairs are asked to help with judging the UKIE SIAM student prize (see below).

- **UKIE SIAM Student Prize**

The UK and Ireland section of SIAM has kindly agreed to sponsor the award of prizes at the meeting for the best student presentations.

1. The prizes will be awarded by a committee consisting of Hussam Al Daas, Scott MacLachlan, and Jemina Tabcart.
2. Student speakers should make themselves known to their session chair before their talk.
3. Session chairs should fill in a **Student Talk Feedback Form** (available in the meeting rooms) for each student talk in their session. On completion, these forms should be passed to a member of the committee or one of the local organisers.
4. The results of the competition will be published on NA Digest after the meeting.

- **Letters of attendance/receipts**

If you require any additional paperwork, such as a letter confirming that you have attended the meeting (and/or given a presentation) or a formal receipt for payment, please leave your name and details of your requirements at the registration desk during the conference, or email your request to naconf@strath.ac.uk by Friday June 30th. These letters will be prepared and despatched via email during the week following the meeting.

- **Reception**

A reception for all registered participants hosted by Glasgow City Council will be held in the City Chambers on Tuesday 27th June from 20:00 to 21:00. The City Chambers is marked on the campus map: entry is from George Square.

- **Conference dinner**

The conference dinner will be held in Òran Mór on Thursday 27th June at 19:00 (for 19:30 dinner).

The venue is located at the top of Byres Road (G12 8QX). Òran Mór can be reached by subway (Hillhead station), bus (6, 6A) or, for those of you wishing to stretch your legs, on foot (50 minutes).

- **Computing facilities**

Wireless access is available in all of the meeting rooms via **eduroam** (login using credentials supplied by your home institution) and **The Cloud** (to connect, create a (free) account). If you require access to a fixed terminal, please contact the organisers to obtain a username and password.

- **Book displays**

There will be books on display for the duration of the conference in room JA326. Room JA327 is also available for conference participants.

- **Luggage on Friday morning**

After checking out on Friday morning, participants may leave luggage in JA327 until 14:00.

- **Bars and restaurants**

There are many bars and restaurants in the Merchant City area located to the south of the campus which are suitable for dinner and refreshments.

- **Sports facilities**

Conference delegates can use the University sports facilities in the new Sports Centre (situated on Cathedral Street, see campus map) for a small fee. More information is available here:

<https://www.strath.ac.uk/strathclydesport/facilities/>.

Please note that you will need to create an account; this can be done at the reception desk.

Booking is not required for the gym or for swim sessions, but is required for all other activities.

Invited Speakers

Coralia Cartis	University of Oxford	cartis@maths.ox.ac.uk
Lars Eldén	Linköping University	lars.elden@liu.se
Emmanuil Georgoulis	Heriot-Watt University & NTU Athens	e.georgoulis@hw.ac.uk
Chen Grieff	University of British Columbia	greif@cs.ubc.ca
Laura Grigori	EPFL and PSI, Switzerland	laura.grigori@epfl.ch
Angela Kunoth	University of Cologne	kunoth@math.uni-koeln.de
Sven Leyffer	Argonne National Laboratory	leyffer@anl.gov
Ricardo Nochetto	University of Maryland	rhn@math.umd.edu
Daniel Peterseim	University of Augsburg	daniel.peterseim@uni-a.de
Gabriel Peyré	DMA, École Normale Supérieure	gabriel.peyre@ens.fr
Catherine Powell	University of Manchester	catherine.powell@manchester.ac.uk
Christiane Tretter	University of Bern	tretter@math.unibe.ch

Tuesday 27th June

<i>Chair:</i>	A Ramage	JA325					
9:00-9:05	Opening Remarks						
9:05-10:05	C Greif	Numerical solution of double saddle-point systems					
10:05-11:05	A Kunoht	Adaptive approximations for PDE-constrained parabolic control problems					
11:05-11:30	COFFEE/TEA						
<i>Chair:</i>	JA325 M4	JA314 M2	JA317 M11	JA506 M5			
11:30-11:55	M Schedensack M4	I Graham M2	V Dolean M11	F Nataf M5			
	Two Discretisations of the Time-Dependent Bingham Problem	Uncertainty Quantification for the Helmholtz equation	Domain decomposition training strategies for physics-informed neural networks	Adaptive coarse spaces for saddle point problems			
11:55-12:20	C Carstensen M4	M Multerer M2	T Rees M11	J Pearson M5			
	dG for elastoplastic evolution?	Isogeometric analysis of rough random acoustic scattering	Preconditioners for mixed finite element problems based on element Schur complements	Preconditioned Iterative Solvers for Instationary Fluid Flow Control Problems			
12:20-12:45	A K Dond M4	A Scaglioni M2	B Chaudet-Dumas M11	J Tabcart M5			
	Error analysis for a distributed optimal control problem governed by the von Kármán equation	Sparse grid approximation of stochastic dynamic micromagnetics	Optimizing the Space-Time Multigrid algorithm for the heat equation	Saddle Point Preconditioners for Weak-Constraint Four-Dimensional Variational Data Assimilation			
12:45-14:00	LUNCH- Lord Todd						
<i>Chair:</i>	J Pestana	JA325					
14:00-15:00	C Powell	How and why to be intrusive					
<i>Chair:</i>	JA325 M4	JA314 M2	JA317 M11	JA506 M5			
15:05-15:30	A Gazca M4	D Silvester M2	P Freese M11	K Benková M5			
	A posteriori analysis for Bingham via equilibrated fluxes	Error estimation and adaptivity for stochastic collocation finite elements	A Super-Localized Generalized Finite Element Method	Fast numerical solvers for pattern formation problems in mathematical biology			
15:30-15:55	J Ellmenreich M4	T Round M2	C McCoid M11	L Bergamaschi M5			
	Mass Conserving Mixed Stress-Strain rate Finite Element Method for Non-Newtonian Fluid Simulations	Goal-oriented adaptivity for stochastic collocation finite element methods	Adaptively optimised Schwarz methods	Some preconditioning techniques for a class of double saddle point linear systems			
15:55-16:20	P Lederer M4	S Dolgov M2	L Theisen M11	I Daužickaité M5			
	Mixed finite elements for Bingham flow in a pipe	Adaptive cross sampling approximation to solutions of parametric PDEs	A Two-Level Domain Decomposition Method for Periodic Schrödinger Eigenstates in Anisotropically Expanding Domains	Randomized preconditioning for least squares iterative refinement			
16:20-16:45	COFFEE/TEA						
<i>Chair:</i>	S. Leyffer	JA325					
16:45-17:45	R Nochetto	(A R Mitchell Lecture) Liquid crystal polymeric networks: modeling, approximation, and computation					
20:00-21:00	RECEPTION - Glasgow City Chambers						

Tuesday 27th June

11:00–11:30

COFFEE/TEA

Chair:

JA505 CT1 **A Hegarty** JA507 M14

11:30-11:55

B Ashby

Discretisation of viscoelastic fluid flows using the generalised Lie derivative

M Hanot

Using complexes to preserve structures in fluid dynamics

M14

11:55-12:20

S Sarwar

Numerical approximation of two dimensional Variable order fractional differential equations

Y Liang

Local bounded commuting projections for Hilbert complexes

M14

12:20-12:45

R Čiegis

A comparison of two templates for three level discrete schemes

F Schnack

Bounded commuting projections for non-matching interfaces

M14

12:45-13:10

J Arf

Isogeometric Analysis and second-order complexes

M14

12:45-14:00

LUNCH- Lord Todd

Chair:

JA505 CT2 **L Boulton** JA507 M14

15:05-15:30

I Duff

Row Replicated Block Cimmino

X Huang

Finite Element Complexes from Complexes

M14

15:30-15:55

P Singh

Uniform and unitary rational approximations of the matrix exponential

E Schulz

Boundary Element Exterior Calculus

M14

15:55-16:20

P Knight

Scaling to semi-doubly stochastic form

R Vázquez

Fast computation of electromagnetic wave propagation with spline differential forms

M14

Wednesday 28th June

<i>Chair:</i>	V Dolean	JA325			
9:00-10:00	L Grigori	Randomization techniques for solving large scale linear algebra problems			
10:00-11:00	C Tretter	Challenges for non-selfadjoint spectral problems in analysis and computation			
11:00–11:30	COFFEE/TEA				
<i>Chair:</i>	JA325 M16	JA314 M2	JA317 CT3 N	Trefethen	JA506 M4
11:30-11:55	F Bertrand M16 Least-Squares methods for eigenvalue problems	L Scarabosio M2 Forward uncertainty quantification with locally supported basis functions	M Weber Computing Brascamp-Lieb Constants through the lens of Thompson Geometry		A Schröder M4 A posteriori error estimates for variational inequalities discretized by higher-order finite elements
11:55-12:20	L Grubišić M16 Adaptive spectral projection based methods for the numerical solution of wave equations with memory	A Istratuca M2 Multilevel Monte Carlo Methods with Smoothing	J Fowkes Approximating sparse Hessian matrices using large-scale linear least squares		J Power CT PDE Constrained Optimisation for Brachytherapy Treatment Planning
12:20-12:45	H Schneider M16 DPG-approximation for eigenvalue problem	A Bespalov M2 Approximating non-linear quantities of interest using adaptive multilevel stochastic Galerkin FEM	M Ndjinga On a shock capturing finite volume method that can solve fully incompressible flows		A Baier-Reinio CT High-Order Finite Element Schemes for the Stokes–Ossager–Stefan–Maxwell Equations
12:45-14:00	LUNCH-Lord Todd				
<i>Chair:</i>	G Barrenechea	JA325			
14:00-15:00	D Peterseim	Multiscale methods for operator compression and surrogate learning			
<i>Chair:</i>	JA325 M16	JA314 M15	JA317 CT4 L	Banjai	JA506 M10
15:05-15:30	D Boffi M16 On the computation of Maxwell’s eigenvalues with nodal elements	M Iannacito M15 Orthogonalization schemes in Tensor Train format	P Herbert A fully discrete hypocoercivity-preserving Galerkin method		J Budd M10 PDE methods for joint reconstruction-segmentation of images
15:30-15:55	P Zilk M16 Approximating Laplace eigenvalues of circular sectors using isogeometric mesh grading	S-I Filip M15 Accelerating DNN training at the arithmetic level: a mixed-precision perspective	Ankur Novel conformal finite element error estimates for fourth order non-linear Rosenau–Burgers model		L Bungert M10 A geometric view of adversarial machine learning
15:55-16:20	U Zerbinati M16 Divergence-free discretisations of the Stokes eigenvalue problem	H Lam M15 Extending randomized low-rank approximation techniques to parameter-dependent problems			A Fazyeny M10 Modelling opinion formation in social networks with p -Laplacians on hypergraphs
16:20-16:45	COFFEE/TEA				
<i>Chair:</i>	JA325 M16	JA314 M15	JA317 M1		JA506 M10
16:45-17:10	A Khan M16 Recent advances in adaptive finite element methods for Stokes eigenvalue problems	X Liu M15 Mixed-precision Paterson–Stockmeyer method for evaluating matrix polynomials	B Verfürth M1 Offline-online strategy for multiscale problems with random perturbations		S Klus M10 Koopman-based spectral clustering of directed and time-evolving graphs
17:10-17:35	NT Tran M16 Adaptive hybrid high-order method for guaranteed lower eigenvalue bounds	E Timsit M15 Randomized Orthogonal Projection Methods for Krylov Subspaces Solvers	A Rupp M1 Hybrid discontinuous Galerkin methods on multiple levels		L-M Kreusser M10 Many-agent systems and mean-field models for semi-supervised learning
17:35-18:00	L Alzaben M16 Non-stabilized virtual element method for acoustic vibration and the discrete compactness property	P Vacek M15 The effect of approximate coarsest-level solves on the convergence of multilevel V-cycle methods	M Hauck M1 Super-localized numerical homogenization		J Latz M10 Can Physics-Informed Neural Networks beat the Finite Element Method?

Wednesday 28th June

11:00–11:30	COFFEE/TEA			
<i>Chair:</i>	JA505 M3	JA507 M12	TL329 M17	
11:30-11:55	M Fry M3 Using the H-GenEO Coarse Space for Efficient Solution of the Helmholtz equation	J Novo M12 POD approximations to the Navier-Stokes equations based on time derivatives	O Bokanowski M17 Neural network schemes for solving first-order HJB equations	
11:55-12:20	A Modave M3 A hybridizable discontinuous Galerkin method with characteristic variables for Helmholtz problems	B García-Archilla M12 Pressure and convection robust bounds for CIP-stabilized divergence-free elements for the Navier-Stokes equations	R Ferretti M17 Efficient implementation of characteristic-based schemes on unstructured triangular grids	
12:20-12:45	E Parolin M3 Stable Trefftz approximation of Helmholtz solutions using evanescent plane waves	C Merdon M12 Raviart–Thomas-enriched Scott–Vogelius finite element methods for the Stokes equations on general meshes	O Lakkis M17 A least squares Hessian/Gradient recovery method for fully nonlinear PDEs in Hamilton–Jacobi–Bellman form	
12:45-14:00	LUNCH-Lord Todd			
<i>Chair:</i>	JA505 M3	JA507 M12	TL329 M17	
15:05-15:30	M Nonino M3 Geometry-based approximation of waves propagating through complex domains	P Knobloch M12 Algebraic stabilizations of convection–diffusion problems and their convergence on general meshes	Y Osborne M17 Analysis and Numerical Approximation of Second-order Mean Field Game Partial Differential Inclusions	
15:30-15:55	C Carvalho M3 Scattering instabilities for metamaterial cavities	S MacLachlan M12 Parameter-robust discretizations and solvers for singularly perturbed problems on curved domains	T Pryer M17 Bound preserving finite elements for nonvariational problems	
15:55-16:20	R Maier M3 Localized implicit time-stepping for the acoustic wave equation	N Madden M12 Solving singularly perturbed problems using enriched finite element spaces	D Šiška M17 Gradient and Mirror Descent for Stochastic Control Problems	
16:20-16:45	COFFEE/TEA			
<i>Chair:</i>	JA505 M3+CT	JA507 M12	TL329 CT5 I Graham	
16:45-17:10	J Bannister M3 An $O(h)$ conforming VIE method for acoustic scattering by fractal inhomogeneities	A Hegarty M12 Fitted finite element methods for convection diffusion problems on Shishkin meshes	K Welzel Generalizing Quasi-Newton Updates to Higher-Order Derivative Tensors	
17:10-17:35	D Hoonhout CT Stability of space-time boundary element methods for 1D wave problems	T Linß M12 Uniform convergence of an arbitrary order balanced FEM applied to a singularly perturbed shell problem	T Shahid Global Sensitivity Analysis of Pollutant Dispersion Uncertainty Quantification Problem	
17:35-18:00	S Leveque CT Parallel-in-time solver for the all-at-once Runge–Kutta discretization	R Hill M12 Generation of layer-adapted meshes using mesh PDEs and numerical derivatives	D Savostyanov Tensor product algorithms for Bayesian inference of networks from epidemiological data	

Thursday 29th June

<i>Chair:</i>	J Mackenzie	JA325		
9:00-10:00	E Georgoulis	<i>hp</i> -Version discontinuous Galerkin methods on essentially arbitrarily-shaped elements		
10:00-11:00	L Elden	Multiway spectral graph partitioning: cut functions, Cheeger inequalities, and a simple algorithm		
11:00–11:30	COFFEE/TEA			
<i>Chair:</i>	JA325 M9	JA314 M8	JA317 M1	JA506 M10
11:30-11:55	A Wathen M9 Parallel preconditioning for the time-dependent Stokes problem	N Trefethen M8 Numerical analytic continuation	G Barrenechea M1 A Multiscale Hybrid Method	M Thorpe M10 Correcting the Bias in Laplace Learning at Low Label Rates
11:55-12:20	I Furci M9 Symbol-based aggregated multigrid method for block Toeplitz linear systems	W Zhu M8 Convergence and Near-optimal Sampling for Multivariate Function Approximations in Irregular Domains via Vandermonde with Arnoldi	A Persson M1 Superconvergence of a multiscale method for ground state computations of Bose-Einstein condensates	S Urbainczyk M10 Computational Methods for Bayesian Imaging with Deep Gaussian Process Priors
12:20-12:45	S Hon M9 A block α -circulant based preconditioned MINRES method for evolutionary partial differential equations	M Colbrook M8 Avoiding discretization issues for nonlinear eigenvalue problems	T Chaumont-Frelet M1 Frequency-explicit analysis of a multiscale finite element method to approximate scattering by highly heterogeneous obstacles	Y van Gennip M10 Discrete-to-continuum limits of graph-based gradient flows
12:45-14:00	LUNCH - Lord Todd			
<i>Chair:</i>	F Arrigo	JA325		
14:00-15:00	S Leyffer	Topological design problems and integer optimization (Fletcher-Powell Lecture)		
<i>Chair:</i>	JA325 M9	JA314 M8	JA317 M1	JA506 CT7 J Fowkes
15:05-15:30	A Miniguano-Trujillo M9 NFFT in Parameter Learning for Nonlocal Image Denoising Models	S Olver M8 Computing Orthogonal Polynomials via Cholesky, QR and QL	O Durán M1 A mixed-dimensional fracture mechanics model based on the linear theory of the Cosserat continuum	F Kwok Analyzing Convergence of Schwarz Waveform Relaxation Methods Using Exponential Weighting
15:30-15:55	N Bootland M9 Using spectral information for the robust solution of positive Maxwell problems via domain decomposition	T Pu M8 A spectral method for fractional integral equations using orthogonal fractional polynomials	A Cangiani M1 Isoparametric Virtual Element Methods	Y Liu Obtaining Pseudo-inverse Solution With MINRES and Preconditioned MINRES
15:55-16:20		R Slevinsky M8 Spatial isometries in multivariate orthogonal polynomials	Z Dong M1 A posteriori error estimates for discontinuous Galerkin methods and hybrid high-order methods on polygonal and polyhedral meshes	G Luhana Block Preconditioners for the Implicit-in-Time Immersed Boundary Method
16:20-16:45	COFFEE/TEA			
<i>Chair:</i>	JA325 M13	JA314 M8	JA317 M1 + CT	JA506 CT9 T Pryer
16:45-17:10	N Boullé M13 Elliptic PDE learning is provably data-efficient	M Webb M8 Sobolev-Orthogonal Bases from Standard-Orthogonal Polynomials	L Mascotto M1 Space-time virtual elements: a priori error analysis, residual error estimators, and adaptivity	J Braun Higher-order far-field boundary conditions for crystal defects computations
17:10-17:35	D Savostianova M13 Robust low-rank training via approximate orthonormal constraints	K Xu M8 Solving nonlinear ODEs with the ultraspherical spectral method	A Trenam CT Structure-preserving discontinuous Galerkin methods for the Poisson-Nernst-Planck system	H Normington A decoupled and unconditionally convergent nodal projection free integrator for the Landau-Lifshitz-Gilbert equation including magnetostriction
17:35-18:00	A Bastounis M13 On the extended Smales 9th problem, phase transitions and the limits of trustworthy AI	I Papadopoulos M8 Sparse spectral methods for fractional PDEs	J Garay CT Multiscale finite element methods for an elliptic optimal control problem with rough coefficients and control constraints	R Maity A priori and a posteriori error analysis for semilinear problems in liquid crystals

19:00 for

Thursday 29th June

11:00–11:30

COFFEE/TEA

Chair: JA505 M16 + CT JA507 M6 TL329 CT6 **D Silvester**

11:30-11:55 **H Hakula** M16 **Z Zhou** M6 **A Amiri**
 Eigenproblems on Poincaré’s Disk: Benchmark Problems and Error Estimates Discovering the subdiffusion model in an unknown medium A nodally bound preserving finite element method for the convection-diffusion-reaction equation

11:55-12:20 **L Boulton** CT **Y Yan** M6 **S Beuter**
 Computation of the pseudospectral boundary of unbounded operators Galerkin finite element approximation of a stochastic semilinear fractional subdiffusion with fractionally integrated additive noise Performance analysis of FEM implementations in Matlab for arbitrary dimensions

12:20-12:45 **C Drysdale** CT **C Green** M6 **A Bloor Riley**
 Computation and Certification of the Pseudospectral Boundary Detailed Error Analysis for a Fractional Adams Method on Caputo–Hadamard Fractional Differential Equations Deflated Gauss-Newton Methods

12:45-14:00

LUNCH-Lord Todd

Chair: JA505 JA507 M6 TL329 CT8 **J Taboart**

15:05-15:30 **L Banjai** M6 **B Kent**
 A comparison of some numerical methods for shifted fractional Laplacians Efficient Adaptive Stochastic Collocation Strategies for Advection-Diffusion Problems with Uncertain Inputs

15:30-15:55 **E Sousa** M6 **I Cheltsov**
 Convergence of numerical methods for fractional diffusion equations with boundaries Stochastic Bilevel Optimization

15:55-16:20 **M Faustmann** M6
 Exponential convergence of hp -FEM for the integral fractional Laplacian

16:20-16:45

COFFEE/TEA

Chair: JA505 M7 JA507 M6 TL329 CT10 **J Pearson**

16:45-17:10 **M Ainsworth** M7 **N Kopteva** M6 **M Zhou**
 Recent Developments in High Order Finite Element Approximation Pointwise-in-time a-posteriori error control for time-fractional parabolic equations Improvement of Mass Conservation in the MINRES Solution of Saddle-Point Systems with Large Right-Hand Sides

17:10-17:35 **F Aznaran** M7 **S Franz** M6 **J Jackaman**
 A uniformly hp -stable element for the stress complex Efficient and stable implementation of higher order methods for time-dependent fractional parabolic equations Preconditioned Iterative Methods for Structure-Preserving Discretisations

17:35-18:00 **P Brubeck** M7 **S Kelly** M6 **P-L Bacq**
 Multigrid solvers for the de Rham complex with optimal complexity in polynomial degree Pointwise-in-time error bounds for a fractional-derivative parabolic problem on quasi-graded meshes Towards a monolithic multigrid method for Oseen problems

Friday 30th June

<i>Chair:</i>	JA325	P Knight			
9:00-10:00	G Peyré	Scaling optimal transport for high-dimensional learning			
10:00-11:00	C Cartis	Dimensionality reduction techniques for nonconvex optimization			
11:00-11:30	COFFEE/TEA				
<i>Chair:</i>	JA325 M13	JA314 M8	JA317 M18		
11:30-11:55	L Beerens	M13	G Vasil	M8	Y Tang M18
	Componentwise adversarial attacks		Sphere we go again: polynomials in polar coordinates		The modified truncated Euler-Maruyama method for stochastic differential equations with concave diffusion coefficients
11:55-12:20	I Tyukin	M13	G Bradshaw	M8	A Leroy
	The Limits of Verifiable Accuracy and Stability in Neural Networks		Spectral Methods for the Debye-Smoluchowski Equation		Adaptive stepsize methods for weak approximation with Langevin dynamics
12:20-12:45	D Higham		T Gutleb	M8	
	When Algorithms Attack		A static memory sparse spectral method for time-fractional PDEs		
<i>Chair:</i>	JA505 M7				
11:30-11:55	K Hu	M7			
	Tensor product finite element BGG complexes				
11:55-12:20	C Parker	M7			
	Implementing high order C^1 -conforming elements with C^0 elements				
12:20-12:45					
12:45-14:00	LUNCH-Foyer outside JA325				
END OF CONFERENCE					

Number	Title	Organiser(s)
M1	Multiscale and Polytopal Discretisation Methods for Complicated Domains and Heterogeneous Structures	Zhaonan Dong and Roland Maier
M2	Recent advances in computational PDEs for uncertainty quantification	Alex Bespalov and Michele Ruggeri
M3	Novel discretisation and solution methods for wave propagation problems	Théophile Chaumont-Frelet and Victorita Dolean
M4	Recent advances in the approximation of variational inequalities	Mira Schedensack and Philip Lederer
M5	Saddle point problems: solvers and preconditioners	Erin Carson and Ieva Daužickaitė
M6	Numerical methods for fractional-derivative problems	Natalia Kopteva and Yubin Yan
M7	Recent advances in finite element methods	Mark Ainsworth and Charles Paker
M8	Spectral methods and orthogonal polynomials	Timon Gutleb, Ioannis Papadopoulos, and Marco Fasoldini
M9	Advances in solvers and preconditioning for PDE problems	Niall Bootland and Sean Hon
M10	PDEs in Data Science	Lisa Maria Kreusser and Jonas Latz
M11	Recent advances in multilevel, multiscale, and parallel in time methods	Hussam Al Daas and Felix Kwok
M12	Recent advances in the robust solution of singularly perturbed differential equations	Niall Madden and Torsten Linß
M13	Mathematical and Computational Foundations of AI	Des Higham and Ivan Tyukin
M14	Structure-preserving discretisations of Hilbert complexes	Kaibo Hu and Deepesh Toshniwal
M15	Approximate Computing in Numerical Linear Algebra	Nick Higham, Xiaobo Liu, and Bastien Vieublé
M16	Recent advances in numerical approximation of eigenvalue problems	Fleurianne Bertrand, Daniele Boffi, and Arbaz Khan
M17	Numerical methods for fully nonlinear partial differential equations	Max Jensen and Iain Smears
M18	Simulating Stochastic Differential Equations	Alix Leroy
