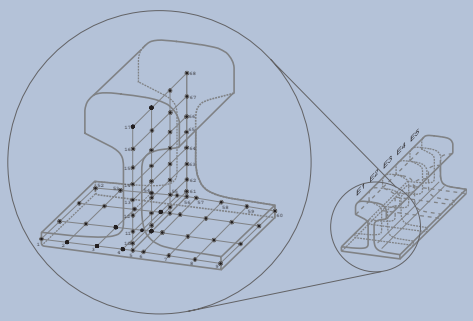
GAMM-SIAM

Conference on Applied Linear Algebra

organized in cooperation with ILAS

HEINRICH HEINE UNIVERSITÄT DÜSSELDORF

BERGISCHE UNIVERSITÄT WUPPERTAL



Düsseldorf, July 24-27, 2006

Joint GAMM–SIAM Conference on Applied Linear Algebra

organized in cooperation with ILAS

July 24–27, 2006, Düsseldorf, Germany

General Information and Scientific Program

We thank our sponsors:

Deutsche Forschungsgemeinschaft

Gesellschaft für Angewandte Mathematik und Mechanik

Society for Industrial and Applied Mathematics

International Linear Algebra Society

Heinrich-Heine-Universität Düsseldorf

Bergische Universität Wuppertal

Gesellschaft von Freunden und Förderern der Heinrich-Heine-Universität Düsseldorf

Gesellschaft der Freunde der Bergischen Universität

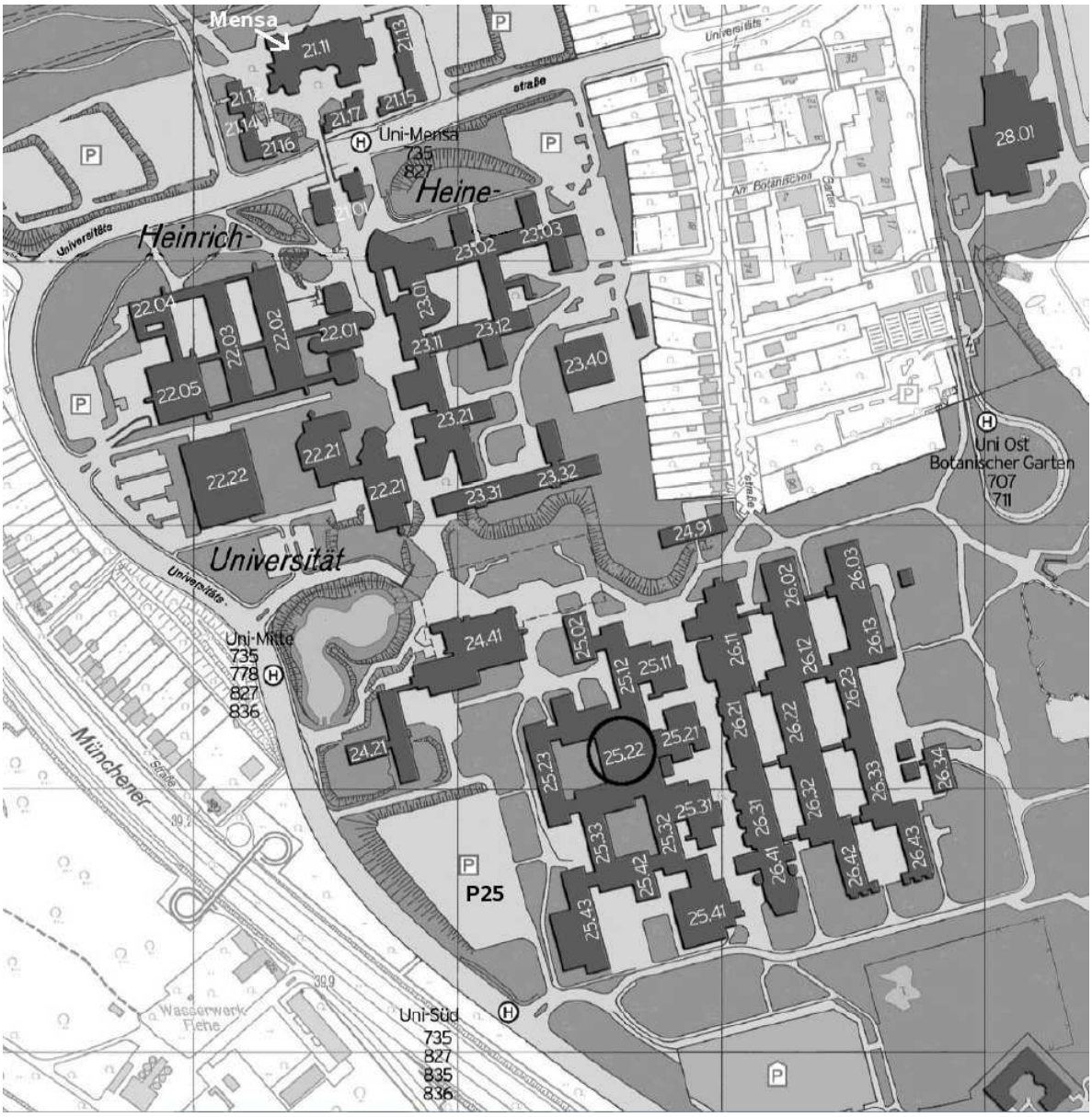
The MathWorks

Cadac GmbH

General Information

Venue

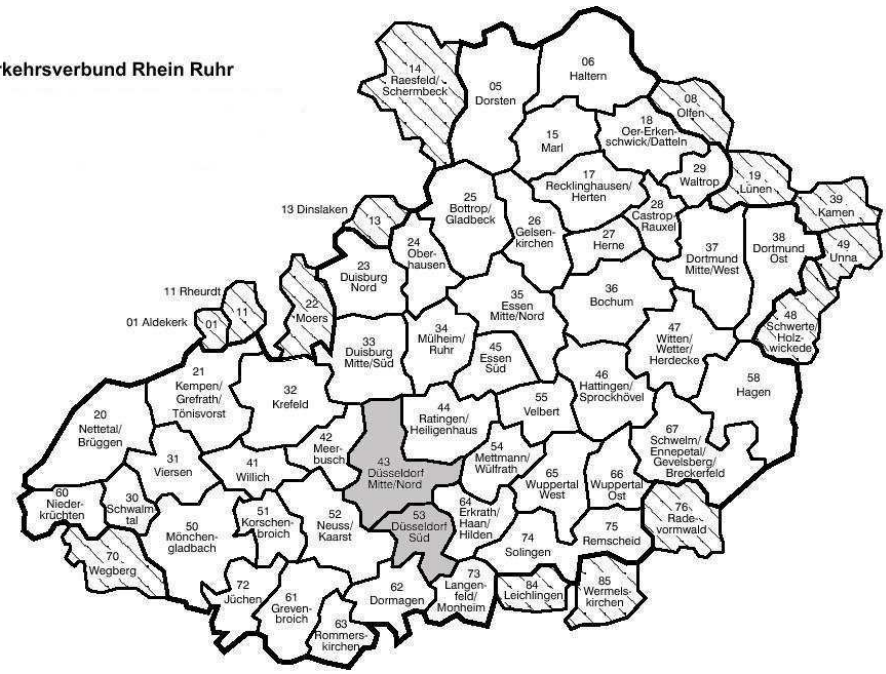
The conference takes place in building 25.22, level 00. The map also shows the relevant bus and tram stops.
If you arrive by car, use parking lot P25, close to bus stop Uni-Süd, sign-posted 'Naturwissenschaften'.
For public transport we suggest to use trams 707 or 711, arriving at stop 'Uni-Ost/Botanischer Garten'.



University of Düsseldorf, southern part of campus

Public transport

The conference badge entitles you to use public transport for free from July 23 to July 27. This is valid for all trams, busses, U-Bahn, S-Bahn and local trains (but not for IC and ICE trains) within the 'Verkehrsverbund Rhein-Ruhr (VRR)' which stretches well beyond Düsseldorf, see map.



An incomplete selection of public transport from hotels to the university:

Hotel	stop	tram no.	dep. time	fre-quency	travel time
Business Wieland	Pempelforter Straße	712[1)]	7:48, 7:58, ...	10'	12'
	change at Bilk	707[2)]	8:05, 8:15, ...	10'	9'
Antares Minotel	Corneliusstraße	701[3)]	7:55, 8:05, ...	10'	6'
	change at Uni-Kliniken	707[2)]	8:10, 8:20, ...	10'	5'
Neues Hotel a. d. Oper	Jan-Wellem-Platz	706[4)]	7:42, 7:54, ...	12'	9'
	change at Bilk	707[2)]	7:55, 8:05, ...	10'	9'
Lady & Sir Astor	Charlottenstr./Oststr.	707[2)]	7:54, 8:04, ...	10'	20'
Eden D'Dorf Center	Luisenstraße	701[3)]	7:54, 8:04, ...	10'	6'
	change at Auf'm Hennekamp	707[2)]	8:09, 8:19, ...	10'	6'
Holiday Inn	Düsseldorf Hbf bus station	707[2)]	7:55, 8:05, ...	10'	19'

[1)] direction Hellriegelstraße
[2)] direction Uni Ost/Botanischer Garten
[3)] direction Benrath Btf
[4)] direction Am Steinberg

Note: There is a software error at the VRR info web page. It shows you connections using tram 711 *although tram 711 is not operating during the whole week of the conference.*

Getting back: tram 707 leaves at Uni Ost every 10 minutes up to 19:01 and then every 20 minutes, starting at 19:20.

Lunch and dinner

Lunch: The university mensa is located at five minutes walking distance in building 21.11. Choose your menu and pay cash at selected desks. (Not all desks accept cash, since students pay with a special student card.)
There are small cafeterias close to the conference venue, but their capacity is very limited.
Dinner: Düsseldorf's old town is also known as 'the longest bar of the world'. So enjoy 'Alt Bier' and local or international food in one of the many restaurants there.

Please note that university rules do not permit eating or drinking in the lecture rooms. We kindly ask you to leave coffee and other beverages at the meeting space.

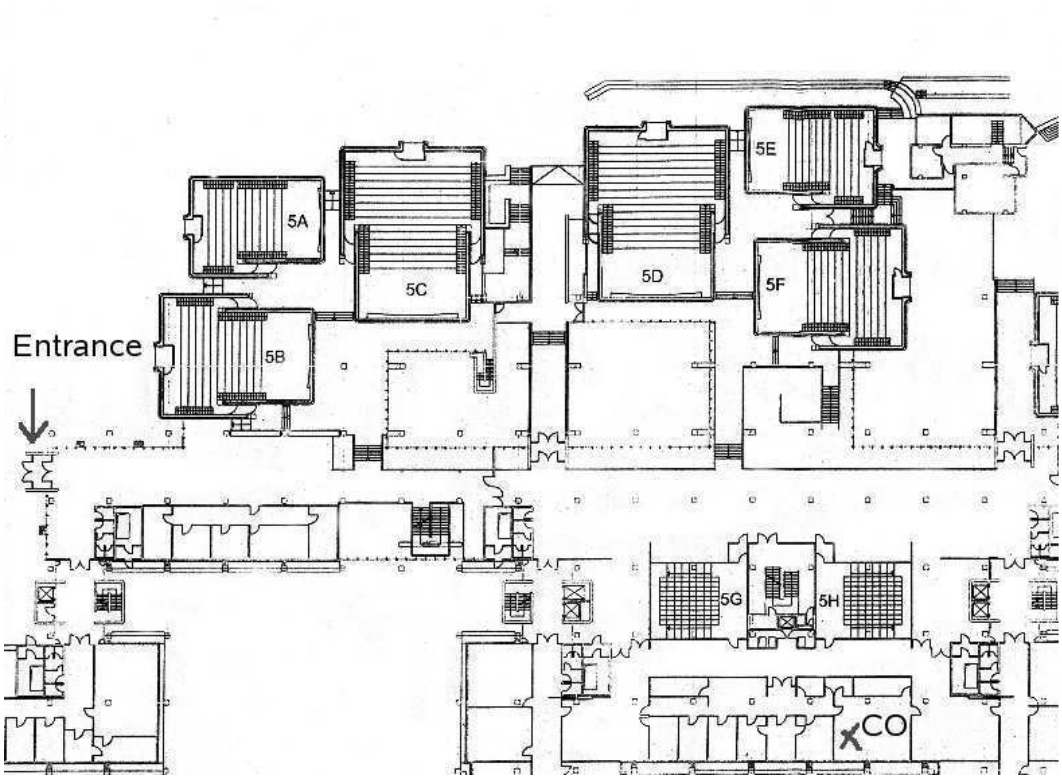
Conference office

After Monday morning, the conference office will be located in building 25.22, level 00, room 53 (marked 'CO' on map).

Phone: 0211 81 13951
Fax: 0211 81 14200

Auditoriums

All talks are in auditoriums 5A, 5B, 5C, 5D and 5F, plenary talks in auditorium 5D.



Computers

25 workstations are available for conference participants in building 25.22, level U1, room 32.
You can also connect to the university's WLAN with your notebook. Access to the workstations and to WLAN requires a personal account and a password which are part of the registration kit where further detailed instructions are given.

Boat trip

Our trip with *MS Warsteiner* will leave at 'Burgplatz', Wednesday, July 26 at 18:00 *sharp*. The trip will last one hour and will mainly lead us through the 'Medienhafen' with its modern architecture.
Please do not forget to bring your voucher.

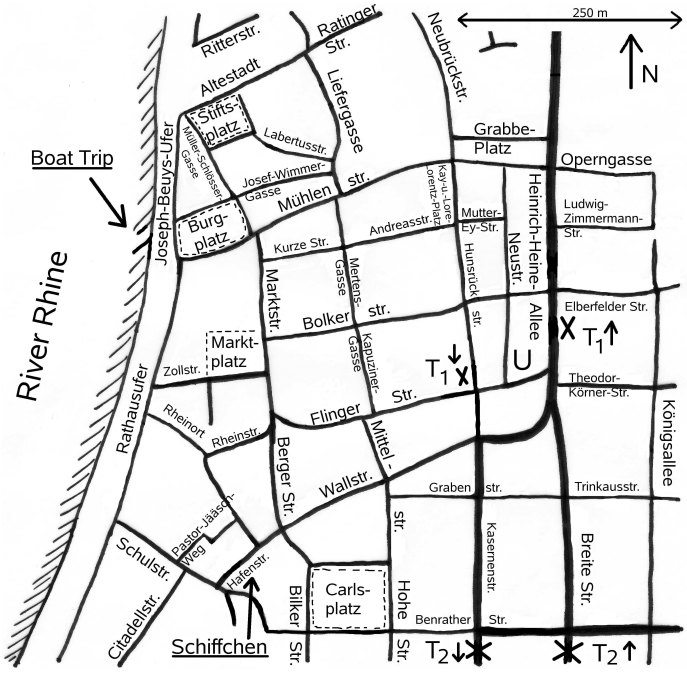
Tram connections from the university:

dep./arr.	time	frequency	stop	tram no
dep	..., 17:01, 17:11	10'	Universität Ost	707, dir. Unterrath
arr	..., 17:09, 17:19	10'	Bilk S	
dep	..., 17:15, 17:25	10'	Bilk S, *same platform*	706 or 712
arr	..., 17:23, 17:33	10'	Heinrich-Heine-Allee[1)]	
walk to Burgplatz (10 minutes)				

[1)] marked T_1 on map

Conference dinner

The conference dinner will be in the brewery 'Zum Schiffchen', Hafenstraße 5 on Wednesday, July 26 at 19:30.
After dinner speaker Henk A. van der Vorst (Utrecht) will give a talk titled 'Big Progress Goes With Small Steps'.
You can choose between several menus, including a vegetarian meal. The first two drinks (beer or soft drinks) are inclusive, additional drinks must be paid.
Please do not forget to bring your voucher.



Düsseldorf Old Town ('Altstadt')

'Zum Schiffchen' is within 10 minutes walking distance from the boat trip stop or from the following public transport stops:
Heinrich-Heine-Allee[1)] (trams 703, 706, 712, 713, 715 or U-Bahn U70, U74-U79)
Benrather Straße[2)] (trams 703, 706, 712, 713, 715)

[1)] marked T_1 on map
[2)] marked T_2 on map

Publications

There will be a special volume of ETNA, the Electronic Transactions on Numerical Analysis devoted to papers presented at this conference. Andreas Frommer, Marlis Hochbruck and Bruno Lang are the editors of this special volume. Manuscripts prepared according to the ETNA guidelines (www.etna.mcs.kent.edu) will undergo the usual refereeing process. Submissions should be sent to

`ala2006_submissions@math.uni-wuppertal.de`

by October 31st, 2006.

Scientific Program

Sunday, July 23

17:00–21:00	Welcome Reception and registration	Schloss Mickeln

The shuttle bus back to selected hotels leaves at 17:30, 18:40, 19:50 and 21:00.
Regular bus line 835 leaves at 17:35, 17:55, 18:15, 18:34, 18:54, 19:24, 19:54, 20:24, 20:54, 21:24, 21:39, 21:54.

Monday, July 24

08:00–08:45	Registration	
08:45–09:00	Opening	
09:00–09:45	Plenary talk	B. Fischer: *Structured linear algebra problems in image registration*
09:45–10:30	Plenary talk	K. Stüben: *A review of algebraic multigrid with emphasis on its industrial application*
10:30–11:00	Coffee	
11:00–13:00	Minisymposium 01	*Markov chains* (organized by D. Szyld)
	Minisymposium 02	*Iterative methods* (organized by Z. Strakoš)
	Minisymposium 03	*Preconditioning for PDE-constrained optimization (I)* (organized by U. Langer, E. W. Sachs)
	Minisymposium 04	*Numerical methods for large sparse eigenproblems (I)* (organized by M. Hochstenbach, D. Kressner, Y. Notay)
	Minisymposium 05	*Linear algebra in electronic structure calculation* (organized by C. Yang, J. Meza)
13:00–14:15	Lunch	
14:15–15:00	Plenary talk	L. De Lathauwer: *Tensor decompositions: an overview*
15:10–16:30	Contributed Session 01	*PDEs*
	Contributed Session 02	*Combinatorial and graph techniques (I)*
	Contributed Session 03	*Stochastic matrices*
	Contributed Session 04	*Eigenvalues and SVD: nonstandard problems and theory*
	Contributed Session 05	*Perturbation theory and error analysis*
16:30–17:00	Coffee	
17:00–19:00	Minisymposium 06	*Eigenvalues in computational chemistry* (organized by T. Carrington)
	Minisymposium 07	*Combinatorial matrix methods* (organized by M. Tsatsomeros)
	Minisymposium 08	*Preconditioning for PDE-constrained optimization (II)* (organized by U. Langer, E. W. Sachs)
	Minisymposium 09	*Numerical methods for large sparse eigenproblems (II)* (organized by M. Hochstenbach, D. Kressner, Y. Notay)
	Minisymposium 10	*History of applied and numerical linear algebra (I)* (organized by I. Ipsen, V. Mehrmann)
19:15–20:15	GAMM FA	Meeting of the GAMM Fachausschuss Angewandte und Numerische Lineare Algebra (Room 25.22.00.81)

Tuesday, July 25

09:00–09:45	Plenary talk	V. Simoncini: *Krylov subspace methods for linear systems and matrix equations*
09:45–10:30	Plenary talk	M. Embree: *Transient behavior of differential-algebraic equations via pseudospectra of matrix pencils*
10:30–11:00	Coffee	
11:00–13:00	Contributed Session 06 Contributed Session 07 Contributed Session 08 Contributed Session 09 Contributed Session 10	*Krylov subspace methods for linear systems* *Eigenvalues and saddle points* *Control and matrix equations* *Least squares and orthogonalization* *Applications (I)*
13:00–14:15	Lunch	
14:15–15:00	Plenary talk	N. J. Higham: *Iterations for matrix roots: convergence and stability*
15:00–16:00	SIAG/LA Prize Award Ceremony and Lecture	
16:00–16:30	Coffee	
16:30–19:00	Minisymposium 11 Minisymposium 12 Minisymposium 13 Minisymposium 14 Minisymposium 15	*Model reduction of large scale dynamical systems* (organized by C. Beattie) *Linear algebra in bioscience* (organized by I. Horenko, C. Schütte) *Numerical solution of saddle point problems (I)* (organized by M. Benzi, J. Liesen) *Applications of moments* (organized by G. H. Golub, J. V. Lambers) *History of applied and numerical linear algebra (II)* (organized by I. Ipsen, V. Mehrmann)
19:15–20:15	SIAG/LA	Meeting of the SIAM Activity Group on Linear Algebra (Auditorium 5D)

Wednesday, July 26

09:00–09:45	Plenary talk	I. S. Dhillon: *From Shannon to Von Neumann: new distance measures for matrix nearness problems*
09:45–10:30	Plenary talk	L. Elsner (ILAS speaker): *Max algebra and its applications*
10:30–11:00	Coffee	
11:00–13:00	Contributed Session 11 Contributed Session 12 Minisymposium 16 Minisymposium 17 Minisymposium 18	*Multigrid* *Applications (II)* *Support preconditioning* (organized by E. Boman, B. Hendrickson) *The evaluation of matrix functions (I)* (organized by O. Ernst) *Analysis and stability of second-order systems (I)* (organized by P. Benner, K. Veselic)
13:00–14:15	Lunch	
14:15–16:15	Minisymposium 19 Minisymposium 20 Minisymposium 21 Minisymposium 22 Minisymposium 23	*Preconditioners for PDEs* (organized by A. Ramage) *Canonical forms in control* (organized by E. Elmroth) *Analysis and stability of second-order systems (II)* (organized by P. Benner, K. Veselic) *Numerical solution of saddle point problems (II)* (organized by M. Benzi, J. Liesen) *Applied linear algebra and differential equations* (organized by A. Ostermann)
16:15	Coffee and departure for the boat trip	
19:30	Conference dinner	H. A. van der Vorst (dinner speaker): *Big progress goes with small steps*

Thursday, July 27

09:00–09:45	Plenary talk	J. Demmel (ILAS speaker): *Stability of group-theoretic algorithms for fast matrix multiplication*
09:45–10:30	Plenary talk	W. Hackbusch: *The technique of hierarchical matrices*
10:30–11:00	Coffee	
11:00–13:00	Minisymposium 24 Minisymposium 25 Minisymposium 26 Minisymposium 27 Minisymposium 28	*The new LAPACK* (organized by J. Demmel) *Ill posed problems* (organized by M. Hanke-Bourgeois) *Hierarchical matrix techniques* (organized by W. Hackbusch) *The evaluation of matrix functions (II)* (organized by O. Ernst) *Structured matrices and image processing* (organized by B. Fischer, S. Henn, J. Modersitzki, K. Witsch)
13:00–14:15	Lunch	
14:15–15:00	Plenary talk	A. Bunse-Gerstner: *Model order reduction with Krylov-based rational interpolation*
15:10–16:30	Contributed Session 13 Contributed Session 14 Contributed Session 15 Contributed Session 16 Contributed Session 17	*Various topics (I)* *Combinatorial and graph techniques (II)* *Iterative methods for linear systems* *Perturbation theory and error analysis: eigenvalues* *Order reduction and ODEs*
16:30–17:00	Coffee	
17:00–19:00	Contributed Session 18 Contributed Session 19 Contributed Session 20 Contributed Session 21 Contributed Session 22	*Iterative methods for linear systems: preconditioning* *Matrix factorizations and updates* *Eigenvalues and SVD: algorithms* *Matrix functions* *Various topics (II)*
19:00	Conference ends	

Monday, July 24

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
08:45			Opening		
09:00			B. Fischer: *Structured linear algebra problems in image registration*		
09:45			K. Stüben: *A review of algebraic multigrid with emphasis on its industrial application*		
10:30	**Coffee**				
	Minisymposium 01: *Markov chains* (D. Szyld)	Minisymposium 02: *Iterative methods* (Z. Strakos)	Minisymposium 03: *Preconditioning for PDE-constrained optimization (I)* (U. Langer, E. W. Sachs)	Minisymposium 04: *Numerical methods for large sparse eigenproblems (I)* (M. Hochstenbach, D. Kressner, Y. Notay)	Minisymposium 05: *Linear algebra in electronic structure calculation* (C. Yang, J. Meza)
11:00	E. Virnik: *An SVD approach to identifying meta-stable states of Markov chains*	O. Ernst: *Superlinear convergence of Krylov subspace methods: potential theory and invariant subspaces*	A. Wathen: *Constraint preconditioning and Schilders factorization in PDE-constrained optimization*	P.-A. Absil: *Implicit Riemannian trust-region method for symmetric generalized eigenproblems*	Y. Saad: *Challenging linear algebra problems in DFT and time-dependent DFT*
11:30	S. J. Borovac: *On the convergence of exact and inexact multiplicative Schwarz methods for singular M-matrices and Markov chains*	M. Arioli: *Stopping criteria in the context of finite element discretization*	W. Zulehner: *Symmetric indefinite preconditioners for saddle point problems*	M. E. Hochstenbach: *Homogeneous and SPAM Jacobi–Davidson*	C. Yang: *A constrained minimization algorithm for electronic structure calculation*
12:00	O. Schneider: *Krylov subspace methods for computing stationary probability distributions of CTMCs*	M. Rozložník: *Numerical stability of iterative methods*	R. Simon: *Fast solution of KKT systems arising from a model control problem*	Y. Notay: *Inner iterations in eigenvalue solvers*	C. Janssen: *Learning to live with linear dependencies in quantum chemistry: from Hartree-Fock theory to local correlation methods*
12:30	E. Gallopoulos: *PageRank computations for compressed link-structures*	J. Liesen: *Challenges for the analysis and understanding of Krylov subspace methods*		R. Morgan: *Restarted Lanczos for nonsymmetric eigenvalue problems and linear equations*	R. J. Harrison: *Eigenproblems in chemistry: from multiresolution and (near) linear scaling algorithms for SCF to multi billion CI vectors*
13:00	**Lunch**				

Monday, July 24 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
14:15			L. De Lathauwer: *Tensor decompositions: an overview*		
	Contributed Session 01: *PDEs* Chair: A. Wathen	Contributed Session 02: *Combinatorial and graph techniques (I)* Chair: O. Schenk	Contributed Session 03: *Stochastic matrices* Chair: I. Marek	Contributed Session 04: *Eigenvalues and SVD: nonstandard problems and theory* Chair: N. Higham	Contributed Session 05: *Perturbation theory and error analysis* Chair: J. Moro
15:10	T. Betcke: *The GSVD and domain decomposition methods for planar eigenvalue problems*	D. Fritzsche: *Extensions of certain graph-based algorithms for preconditioning*	I. Pultarová: *Convergence issues of some classes of iterative aggregation-disaggregation methods in computing Markov chains*	D. S. Mackey: *Definite pencils and hyperbolic polynomials*	J. Barlow: *A note on the error analysis of classical Gram–Schmidt*
15:30	C. David: *Matricial form of finite differences problems: a new approach*	L. Grigori: *Characterizing the fill of sparse Gaussian elimination on bipartite graphs*	N. R. Rao: *Stochastic eigen-inference from large empirical covariance matrices*	R. Mathias: *Determining hyperbolicity and ellipticity of quadratic eigenvalue problems*	S. Furtado: *Perturbation of unitoid matrices*
15:50	P. Koev: *Accurate eigenvalues of elliptic PDEs using finite elements*	U. Naumann: *Trading fill-out for fill-in in Jacobian accumulation*	T. Selee: *Eigendecompositions for low-rank updates of the stochastic Google matrix*	M. L. Overton: *The search for the nearest defective matrix*	M. Peláez: *Structured Hölder condition number of multiple defective eigenvalues*
16:10	Petr Zizler: *The Spectrum of a Fourier migration matrix pencil*	J. Scott: *Refinement algorithms for bandwidth reduction*	R. S. Wills: *Computing accurately ordered PageRank scores*	F. Tisseur: *On structured condition numbers and backward errors in scalar product spaces*	I. Wróbel: *Structured matrices and polynomial interpolation*
16:30	**Coffee**				

Monday, July 24 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
	Minisymposium 06: *Eigenvalues in computational chemistry* (T. Carrington)	Minisymposium 07: *Combinatorial matrix methods* (M. Tsatsomeros)	Minisymposium 08: *Preconditioning for PDE-constrained optimization (II)* (U. Langer, E. W. Sachs)	Minisymposium 09: *Numerical methods for large sparse eigenproblems (II)* (M. Hochstenbach, D. Kressner, Y. Notay)	Minisymposium 10: *History of applied and numerical linear algebra (I)* (I. Ipsen, V. Mehrmann)
17:00	Y. Saad: *Diagonalization algorithms in real space methods for electronic structure*	S. Kirkland: *Combinatorial considerations for a bound on subdominant eigenvalues of stochastic matrices*	A. Kunoth: *Multiscale methods for PDE-constrained control problems: optimal preconditioners and fast iterative solvers*	G. Sleijpen: *Effective subspace expansion for computing eigenpairs*	G. H. Golub: *On the development of numerical algorithms: a personal voyage*
17:30	R. Shepard: *The subspace projected approximate matrix (SPAM) iterative diagonalization method*	D. Olesky: *A family of inertially arbitrary patterns that is not potentially nilpotent*	R. Griesse: *Preconditioning of linear systems arising in the optimal control of MHD*	A. Stathopoulos: *PRIMME: PReconditioned Iterative Multi-Method Eigensolver, a robust, efficient and flexible Hermitian eigenvalue software*	M. H. Gutknecht: *From qd to LR and QR*
18:00	H. O. Karlsson: *Computing vibrational eigenstates using Lanczos algorithms and zeroth order eigenstates*	P. van den Driessche: *Potentially nilpotent and spectrally arbitrary even cycle sign patterns*	R. Stainko: *An optimal solver to a KKT-system arising from local stress constrained topology optimization*	D. Kressner: *Structure-preserving iterative refinment of invariant subspaces*	Z. Strakoš: *Lanczos tridiagonalization and Golub-Kahan bidiagonalization: ideas, connections and impact*
18:30	T. Carrington: *New ideas for computing complex eigenvalues of an asymmetric matrix applied to metastable states*	M. Tsatsomeros: *P-matrices and the principal minor assignment problem*	M. Weiser: *Preconditioning interior point methods for PDE optimization and identification*	R. Lehoucq: *Discrete dynamical systems and preconditioned eigensolvers*	M. Benzi: *Early research on iterative methods: the Italian contribution*

Tuesday, July 25

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
09:00			V. Simoncini: *Krylov subspace methods for linear systems and matrix equations*		
09:45			M. Embree: *Transient behavior of differential-algebraic equations via pseudospectra of matrix pencils*		
10:30	**Coffee**				

Tuesday, July 25 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
	Contributed Session 06: *Krylov subspace methods for linear systems* Chair: J. Liesen	Contributed Session 07: *Eigenvalues and saddle points* Chair: Y. Saad	Contributed Session 08: *Control and matrix equations* Chair: A. Bunse-Gerstner	Contributed Session 09: *Least squares and orthogonalization* Chair: L. Reichel	Contributed Session 10: *Applications (I)* Chair: J. Modersitzki
11:00	B. Beckermann: *GMRES error estimates in terms of the numerical range*	H. Schwetlick: *A half-step Jacobi–Davidson-like update formula of order* $(3+\sqrt{5})/2 \approx 2.61$ *for nonnormal matrices*	M. I. Garcia-Planas: *Computing the hierarchy closure of the space of singular systems under derivative feedback*	X.-W. Chang: *Numerical methods for integer least squares problems*	H. R. Behmard: *An efficient reconstruction method for discrete band-limited signals*
11:20	E. de Sturler: *Convergence issues in recycling Krylov subspaces*	Y. Yamamoto: *On the use of sparse direct solver in a projection method for generalized eigenvalue problems using numerical integration*	E. Jarlebring: *Computing critical delays for neutral time delay systems using a quadratic eigenproblem*	K. Hayami: *GMRES methods for least squares problems*	M. Kilmer: *A regularized Gauss–Newton method for nonlinear imaging problems in diffuse optical tomography*
11:40	H. Hasegawa: *Comparison of conjugate gradient method for nonsymmetric matrices*	J. Zítko: *Updated Arnoldi factorization for derogatory and defective matrices*	V. A. Tsachouridis: *Hadamard scaling of matrix quadratic equations*	D. M. Sima: *Regularization for the total least squares problem*	C. Klein: *Fourth-order time stepping for stiff PDEs in the low dispersion limit*
12:00	J. Langou: *GCR vs Flexible GMRES*	A. de Niet: *Two preconditioners for the saddle point equation*	F. M. Dopico: *A parametrization of the group of symplectic matrices and its applications*	I. Hnětynková: *Golub–Kahan bidiagonalization and stopping criteria in solving ill-posed problems*	R. J. Santos: *A comparison between different bases in image reconstruction from nonuniform samples*
12:20	H. Sadok: *New results about GMRES convergence*	S. Dollar: *Regularized saddle point problems and implicit-factorization preconditioners*	C.-H. Guo: *Iterative solution of a nonsymmetric algebraic Riccati equation*	C. Popa: *Algebraic multigrid smoothing property of Kaczmarz's relaxation for general rectangular linear systems*	M. Schuermans: *The use of total least squares data fitting in the shape from moments problem*
12:40	P. Tichý: *Ideal GMRES and the polynomial numerical hull for a Jordan block*	P. Psarrakos: *Pseudospectra of matrix polynomials and their boundaries*	J. Saak: *ADI shift parameter computation for large scale algebraic Riccati and Lyapunov equations arising in the LQR problem for parabolic PDEs*	L. Rodman: *Maps that preserve orthogonality on real and complex projective spaces*	A. Yoshimura: *Linear algebra problems for simulating the railway vehicle-track dynamic interactions*
13:00	**Lunch**				

Tuesday, July 25 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
14:15			N. J. Higham: *Iterations for matrix roots: convergence and stability*		
15:00			SIAG/LA Prize Award ceremony and talk. Prize winners: Inderjit S. Dhillon and Beresford N. Parlett		
16:00	**Coffee**				
	Minisymposium 11: *Model reduction of large scale dynamical systems* (C. Beattie)	Minisymposium 12: *Linear algebra in bioscience* (I. Horenko, C. Schütte)	Minisymposium 13: *Numerical solution of saddle point problems (I)* (M. Benzi, J. Liesen)	Minisymposium 14: *Applications of moments* (G. H. Golub, J. V. Lambers)	Minisymposium 15: *History of applied and numerical linear algebra (II)* (I. Ipsen, V. Mehrmann)
16:30	T. Stykel: *Balanced truncation model reduction for optimal control problems*	M. Weber: *Robust Perron cluster analysis in conformation dynamics*	R. Lehoucq: *A primal based penalty preconditioner for elliptic saddle point systems*	G. H. Golub: *Matrices and moments: perturbation for least squares*	H. Schneider: *The linear algebra world of 50 years ago*
17:00	D. C. Sorensen: *A parameter free ADI-like method for the numerical solution of large scale Lyapunov equations*	E. Dittmer: *Parameter estimation in Markov jump processes*	E. W. Sachs: *Block preconditioners in PDE-constrained optimization*	G. Meurant: *Estimates of the error in the preconditioned conjugate gradient algorithm*	F. L. Bauer: *Overlooked numerical aspects in the history of continued fractions*
17:30	U. Baur: *Model reduction for large-scale systems based on hierarchical matrix arithmetic*	E. Virnik: *Positive descriptor systems*	M. Tůma: *Null-space methods for solving saddle-point problems*	L. Reichel: *Orthogonal polynomials, quadrature, and ill-posed problems*	J. Stoer: *The Gatlinburg Symposia and their influence on the development of numerical linear algebra*
18:00	S. Gugercin: *An iterative SVD-Krylov based method for model reduction*	J. Schmidt-Ehrenberg: *Application and extension of generalized partial Procrustes analysis for the visualization of molecular conformations*	M. Benzi: *An augmented Lagrangian approach for the Oseen problem*	J. V. Lambers: *Derivation of high-order spectral methods for time-dependent PDE using modified moments*	R. S. Varga: *Reminiscences in developments in applied linear algebra*
18:30	C. Beattie: *Inexact interpolation for model reduction*				V. Mehrmann: *The mathematical diaries of Helmut Wielandt: a gold mine for problems and solutions in applied and numerical linear algebra*

Wednesday, July 26

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
09:00			I. S. Dhillon: *From Shannon to Von Neumann: new distance measures for matrix nearness problems*		
09:45			L. Elsner (ILAS speaker): *Max algebra and its applications*		
10:30	**Coffee**				

Wednesday, July 26 (continued)

Time	Auditorium 5B	Auditorium 5C
	Contributed Session 11: *Multigrid* Chair: K. Stüben	Contributed Session 12: *Applications (II)* Chair: NN
11:00	A. Aricò: *Algebraic multigrid for multilevel Toeplitz and matrix algebra linear systems: proof of convergence and optimality*	T.-M. Hwang: *Numerical schemes for three dimensional irregular shape quantum dots over curvilinear coordinate systems*
11:20	M. Bollhoefer: *Algebraic multigrid for symmetric indefinite systems*	M. Markiewicz: *Nonlinear eigenvalue problems in energy band calculation of semiconductor quantum dots*
11:40	M. Donatelli: *Regularization by multigrid-type algorithms*	J. Moro: *A new algorithm for frequency isolation in undamped spring-mass systems*
12:00	R. Fischer: *Multigrid methods, structured matrices, and the Helmholtz equation*	N. Wagner: *An inverse eigenvalue problem for a symmetric arrowhead matrix*
12:20	T. Huckle: *Fourier analysis for twogrid methods and optimal smoothing*	S.-M. Chang: *Continuation BSOR-LG method in multi-component Bose–Einstein condensates*
12:40	C. Mense: *On algebraic multilevel methods for non-symmetric system*	S.-F. Shieh: *Bifurcation analysis and computational study of a multi-component Bose–Einstein condensate*
13:00	**Lunch**	

Time	Auditorium 5D	Auditorium 5A	Auditorium 5F
	Minisymposium 16: *Support preconditioning* (E. Boman, B. Hendrickson)	Minisymposium 17: *The evaluation of matrix functions (I)* (O. Ernst)	Minisymposium 18: *Analysis and stability of second-order systems (I)* (P. Benner, K. Veselic)
11:00	D. A. Spielman: *Nearly-linear time algorithms for solving symmetric, diagonally-dominant linear systems, and approximating Fiedler vectors for spectral partitioning*	N. J. Higham: *Computing $f(A)b$ for matrix functions f*	P. Lancaster: *Spectral conditions for stability of vibrating systems*
11:30	G. Shklarski: *Rigidity in finite-element matrices: sufficient conditions for the rigidity of structures and substructures*	L. N. Trefethen: *Talbot quadratures and rational approximations*	C. Pommer: *Gyroscopic stabilization and indefinite damped mechanical systems*
12:00	E. Boman: *Solving elliptic finite element systems in nearly linear time with support preconditioners*	M. E. Hochstenbach: *Subspace extraction for matrix functions*	P. Hagedorn: *Stability and self excited vibrations of axially moving rods with frictional contact*
12:30	A. Frangioni: *Subgraph-based preconditioners for interior-point approaches to network flow problems*	M. Eiermann: *Convergence of Krylov approximations for matrix functions*	H. Voss: *Reducing large gyroscopic eigenproblems by automated multi-level substructuring*
13:00	**Lunch**		

Wednesday, July 26 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
	Minisymposium 19: *Preconditioners for PDEs* (A. Ramage)	Minisymposium 20: *Canonical forms in control* (E. Elmroth)	Minisymposium 21: *Analysis and stability of second-order systems (II)* (P. Benner, K. Veselic)	Minisymposium 22: *Numerical solution of saddle point problems (II)* (M. Benzi, J. Liesen)	Minisymposium 23: *Applied linear algebra and differential equations* (A. Ostermann)
14:15	A. Ramage: *Element-based preconditioners for problems in geomechanics*	G. Boutry: *The generalized eigenvalue problem for non-square pencils*	E. Mengi: *A singular value characterization of the distance to uncontrollability for higher order systems and a practical algorithm exploiting the singular value characterization*	D. Loghin: *Stopping criteria for mixed finite element methods*	A. Ostermann: *Numerical integration needs linear algebra*
14:45	M. Neytcheva: *Preconditioning of nonsymmetric saddle point systems as arising in modelling of visco-elastic problems*	C. Schröder: *Structured Kronecker forms for palindromic matrix pencils*	C. Mehl: *Triangular representations of second order systems*	A. Forsgren: *On the solution of symmetric indefinite systems that arise in optimization*	T. Schmelzer: *The fast evaluation of φ-functions for exponential integrators for stiff PDEs*
15:15	C. E. Powell: *Preconditioners for mixed formulation of groundwater flow problems*	F. De Terán: *On the change of canonical structures under low rank perturbations: from Jordan to Weierstrass and Kronecker*	N. Truhar: *Bounds on the solution to the Lyapunov equation with a general stable matrix*	J. Gondzio: *Direct solution of saddle point problems of dimension 10^9 arising in optimization with interior point methods*	A. Nonnenmacher: *Dynamical low-rank approximation*
15:45	C. Greif: *Preconditioners for the discretized time-harmonic Maxwell equations in mixed form*	P. Johansson: *StratiGraph for interactive investigation of canonical structures of matrices and matrix pencils*	M. Stoll: *A Krylov-Schur like method for quadratic eigenvalue problems with Hamiltonian symmetry*	O. Schenk: *Combinatorial approaches to the solution of saddle-point problems in large-scale interior-point optimization*	Achim Schädle: *Fast Runge-Kutta approximation of inhomogeneous parabolic differential equations*
16:15	**Coffee and departure for the boat trip**				
19:30	**Conference dinner in brewery 'Zum Schiffchen'** H. A. van der Vorst (dinner speaker): *Big progress goes with small steps*				

Thursday, July 27

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
09:00			J. Demmel (ILAS speaker): *Stability of group-theoretic algorithms for fast matrix multiplication*		
09:45			W. Hackbusch: *The technique of hierarchical matrices*		
10:30	**Coffee**				
	Minisymposium 24: *The new LAPACK* (J. Demmel)	Minisymposium 25: *Ill posed problems* (M. Hanke-Bourgeois)	Minisymposium 26: *Hierarchical matrix techniques* (W. Hackbusch)	Minisymposium 27: *The evaluation of matrix functions (II)* (O. Ernst)	Minisymposium 28: *Structured matrices and image processing* (B. Fischer, S. Henn, J. Modersitzki, K. Witsch)
11:00	J. Demmel: *The future of LAPACK and ScaLAPACK (I)*	T. Hohage: *Iterative methods for linear inverse problems with random noise*	L. Grasedyck: *Domain decomposition based $\mathcal{H}$-matrices for FEM*	V. Druskin: *On continuum limits of discrete inverse problems*	S. Henn: *PDE based techniques for image registration*
11:30	S. Hammarling: *The future of LAPACK and ScaLAPACK (II)*	J. Nagy: *Lanczos methods for ill-posed problems in image processing*	J. Djokić: *Efficient update of hierarchical matrices for BEM*	A. Frommer: *Computing* $\mathrm{sign}(A)v$ *with applications in QCD*	J. Modersitzki: *KKT systems in constrained image registration*
12:00	C. Vömel: *Recent research around the MRRR algorithm*	L. Reichel: *Decomposition methods for ill-posed problems*	R. Kriemann: *Parallel hierarchical matrices*	M. Hönig: *Regularization of inverse problems by exponential integrators*	M. Kilmer: *Kronecker products, tensor decompositions and 3D image processing applications*
12:30	B. Kågström: *Multishift variants of the QZ algorithm with aggressive early deflation*	H. Egger: *Preconditioning iterative regularization methods in Hilbert scales*	L. Banjai: *$\mathcal{H}$-matrix techniques for high-frequency Helmholtz BEM*		M. Droske: *Feature-preserving higher-order geometric regularization*
13:00	**Lunch**				

Thursday, July 27 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
14:15			A. Bunse-Gerstner: *Model order reduction with Krylov-based rational interpolation*		
	Contributed Session 13: *Various topics (I)* Chair: L. Cvetkovic	Contributed Session 14: *Combinatorial and graph techniques (II)* Chair: S. Kirkland	Contributed Session 15: *Iterative methods for linear systems* Chair: M. Gutknecht	Contributed Session 16: *Perturbation theory and error analysis: eigenvalues* Chair: J. Barlow	Contributed Session 17: *Order reduction and ODEs* Chair: P. Benner
15:10	A. Edelman: *Parallel numerical linear algebra systems*	P. Chebotarev: *When is the Laplacian spectrum of a weighted digraph real?*	K. Abe: *A variant of the Orthomin(k) method for solving linear systems*	S. Gaubert: *Perturbation of eigenvalues of matrix pencils and min-plus algebra*	R. Eid: *Equivalence of Laguerre–based model order reduction and moment matching*
15:30	E. Ullmann: *Solution strategies for stochastic finite element discretizations*	N.-P. Chiang: *The chaotic numbers of complete multipartite graphs*	E. R. Boudinov: *A generalized conjugate direction method for nonsymmetric linear systems*	L. Grubišić: *Extracting spectral information from large "singularly perturbed" matrices*	B. Salimbahrami: *Order reduction of second order systems with proportional damping*
15:50	P. C. Müller: *An eigenvalue and eigenvector problem in linear vibration systems*	M. Bolten: *Hierarchically refined grid for the efficient calculation of boundary conditions for the simulation in infinite domains*	J. Jordan: *Linear equation solvers via robust and optimal control*	V. Janovský: *The analytic SVD: on the non-generic points on the path*	S. Kräutle: *Reduction of the problem size through linear algebra for the problem of reactive transport in porous media*
16:10	Y. Wei: *Condition numbers for structured least squares problems*		L. Krukier: *Special product triangular skew-Hermitian splitting iteration methods for strongly non-Hermitian positive definite linear equation systems*		J. Claeyssen: *Higher-order discrete evolution systems: analytic properties involving several matrices and numerical eigenvalue methods*
16:30	**Coffee**				

Thursday, July 27 (continued)

Time	Auditorium 5B	Auditorium 5C	Auditorium 5D	Auditorium 5A	Auditorium 5F
	Contributed Session 18: *Iterative methods for linear systems: preconditioning* Chair: M. Tuma	Contributed Session 19: *Matrix factorizations and updates* Chair: E. Gallopoulos	Contributed Session 20: *Eigenvalues and SVD: algorithms* Chair: K. Veselic	Contributed Session 21: *Matrix functions* Chair: V. Simoncini	Contributed Session 22: *Various topics (II)* Chair: H. Arndt
17:00	X. Du: *On the convergence of additive Schwarz preconditioned GMRES*	E. Gallopoulos: *Structured initialization for head start in nonnegative matrix factorization*	J. Berns-Müller: *Inexact inverse iteration applied to a Jordan block*	J. Niehoff: *Approximation of matrix operators applied to a set of vectors*	F. Uhlig: *A geometric level set method for transcendental equations from chemical engineering with multiple roots and bifurcation*
17:20	J. Duintjer Tebbens: *Preconditioner updates for sequences of sparse, large and nonsymmetric linear systems*	J. M. Molera: *Multiple LU factorizations of a singular matrix*	P. Koev: *Accurate eigenvalues of sign-regular matrices*	M. Popolizio: *On acceleration methods for approximating the matrix exponential*	M. Bershadsky: *On classification of spatial matrices*
17:40	D. Noutsos: *Preconditioning block Toeplitz matrices*	Z. Drmač: *Floating point issues in rank revealing QR factorization and its applications*	C. Vömel: *Accelerating the parallel band edge state calculation of a semiconductor quantum dot*	L. Knizhnerman: *The quality of the Gauss–Arnoldi quadrature for* $\langle (zI - A)^{-1}\varphi, \varphi \rangle$ *and application to Padé-like approximation*	T. Schulte-Herbrüggen: *The local* C*-numerical range and its relation to gradient flows in quantum information*
18:00	A. Kallischko: *Factorized sparse approximate inverses for statics' simulations*	X. Vasseur: *On the computation of the null space of a sparse matrix*	D. Watkins: *The reduction to Hamiltonian Schur form explained*	M. Sustik: *Efficient updates in Bregman's algorithm optimizing for von Neumann matrix divergence with optional range space constraint*	D. Janovská: *Roots of quaternions*
18:20	J. Mayer: *A new multilevel ILU-preconditioner with pivoting by columns and row interchanges to improve sparsity*	K. Ziętak: *Applications and algorithms for the polar decomposition of a matrix*	Y. Nakamura: *New shifted algorithm with ensured convergence to singular values of bidiagonal matrices*	M. A. Botchev: *On Krylov subspace matrix function evaluations in time integration schemes for space discretized Maxwell's equations*	O. Kirillov: *Unfolding of eigenvalue surfaces near a diabolic point due to a complex perturbation*
18:40	M. Caliari: *Comparing Leja and Krylov approximations of large scale matrix exponentials*	A. Mohsen: *A rank-one variable metric approach for solving nonsymmetric linear systems of equations*	P. R. Willems: *A MRRR algorithm for the bidiagonal SVD*	N. Moraca: *Upper bounds for infinity norm of the inverse of SDD and* $\mathcal{S}$*-SDD matrices*	M. Ziad: *A singular homogeneous quasilinear system of partial differential equations*