PRECONDITIONING 2019

Program

- PDF version of program
- Link to All abstracts ; Link to All submitted Minisymposia.

Schedule for Day 1: July 1, 2019

8:00am -- ----	***Registration***		
8:30am -- 8:45am	***Welcome remarks [Yousef Saad]***		
Invited Presentation - IP1 ***[Chair: Esmond Ng, Room: KH 3-180]***			
8:45am -- 9:30am	Martin J. Gander	(IP) Non-Linear Preconditioning Explained	
Invited Presentation - IP2 ***[Chair: Andy Wathen, Room: KH 3-180]***			
9:30am -- 10:15am	Patrick E. Farrell	(IP) A Reynolds-robust preconditioner for the 3D stationary Navier--Stokes	
10:15am -- 10:45am Coffee Break			
# 1	**Contributed Presentations 1: Polynomial Preconditioners** ***[Chair: Daniel Osei-Kuffuor]***		
room KH 3-180	10:45am -- 11:15am	11:15am -- 11:45am	11:45am -- 12:15pm
	Xin Ye	Ron Morgan	Jennifer Loe
	Complex Polynomial Preconditioners for Indefinite Systems	A New Stable Polynomial Preconditioned GMRES	Polynomial Preconditioning for Avoiding Communication in GMRES
# 2	**Contributed Presentations 2: Preconditioners for Special Problems** ***[Chair: Ruipeng Li]***		
room KH 2-260	10:45am -- 11:15am	11:15am -- 11:45am	11:45am -- 12:15pm
	Matthias Taus	Josef Sifuentes	Xin Xing
	L-Sweeps: A scalable parallel preconditioner for the high-frequency Helmholtz equation	An Approximate Deflation Preconditioning Method Based on Multiple Grids for Wave Scattering Problems	An HSS Preconditioner for Evolving Kernel Matrix Systems
# 3	**Contributed Presentations 3: Preconditioners for Saddle Point Systems** ***[Chair: Chen Greif]***		
room KH 3-210	10:45am -- 11:15am	11:15am -- 11:45am	11:45am -- 12:15pm
	Achraf Badahmane	Susanne Bradley	Chen Greif
	Preconditioned global Krylov subspace methods for solving saddle point systems with multiple right-hand sides	Preconditioners for Double Saddle Point Systems	Block Preconditioners for Incompressible Magnetohydrodynamics
12:15pm--1:45pm Lunch Break			

Invited Presentation - IP3 ***[Chair: Wil Schilders, Room: KH 3-180]***				
1:45pm -- 2:30pm	Carmen Rodrigo	(IP) Robust Preconditioners for Biot's Consolidation Model		
2:30 -- 3:00pm Coffee Break				
# 1	**Minisymposium 1: Preconditioning of PDEs for next-generation computers** ***[Chair: Massimiliano Ferronato]***			
room KH 3-180	3:00pm -- 3:30pm	3:30pm -- 4:00pm	4:00pm -- 4:30pm	4:30pm -- 5:00pm
	Andy Wathen	Edmond Chow	Carlo Janna	Daniel Osei-Kuffuor
	Parallel preconditioning for time-dependent PDEs	Preconditioned Krylov Subspace Methods for Sampling Multivariate Gaussian Distributions	An adaptive AMG preconditioner for modern High Performance Computers	Algebraic Multigrid Preconditioners for Scalable Simulation of Reservoir Geomechanics and Multiphase Flow
# 2	**Minisymposium 2: Preconditioning for Machine Learning and Machine Learning for Preconditioning** ***[Chair: Jie Chen]***			
room KH 2-260	3:00pm -- 3:30pm	3:30pm -- 4:00pm	4:00pm -- 4:30pm	4:30pm -- 5:00pm
	Jie Chen	Shashanka Ubaru	Lucas Erlandson	Boris Shustin
	Preconditioner Selection for General Linear Systems by Using Neural Networks	Spectrum approximation by Lanczos Quadrature and Preconditioned SVRG	Preconditioning for Fast Solves in Gaussian Processes Accelerated by Hierarchical Matrices	Randomized Riemannian Preconditioning for Quadratically Constrained Problems
# 3	**Contributed Presentations 4: Low-rank Approximation preconditioners** ***[Chair: Ray Tuminaro]***			
room KH 3-210	3:00pm -- 3:30pm	3:30pm -- 4:00pm	4:00pm -- 4:30pm	4:30pm -- 5:00pm
	Erik G. Boman	Jakub Kruzik	Tianshi Xu	Vasileios Kalantzis
	SpaND: An Algebraic Sparsified Nested Dissection Algorithm Using Low-Rank Approximations	High-performance Deflated Conjugate Gradient Method	GeMSLR: A Multilevel Low-Rank Preconditioning and Solution Package	Preconditioning sparse SPD linear systems with multiple right-hand sides by recycling and reverse Galerkin projections
5:30pm -- 7:00pm ***Reception*** **West Wing Dining room in the Campus club: Directions**				

Schedule for Day 2: July 2, 2019

Invited Presentation - IP4 *[Chair: Scott McLachlan, Room: KH 3-180]*				
8:30am -- 9:15am	Lexing Ying	(IP) Preconditioning high frequency wave equations		
Invited Presentation - IP5 *[Chair: Yousef Saad, Room: KH 3-180]*				
9:15am -- 10:00am	Miroslav Tuma	(IP) Solving sparse-dense linear least-squares problems		
10:00 -- 10:30am ***Coffee Break*** **and** 📷 **Conference Photo**				
# 1	**Minisymposium 3: Preconditioners for Saddle Point Problems** *[Chair: Wil Schilders]*			
room KH 3-180	10:30am -- 11:00am	11:00am -- 11:30am	11:30am -- 12:00pm	12:00pm -- 12:30pm
	Xin He	Lawrence Mitchell	Hana Hornikova	Jos Maubach
	Efficient and robust preconditioners for high Reynolds number laminar flows	Flexible computational abstractions for complex preconditioners	Application of Block Preconditioners to Isogeometric Analysis Discretizations of the Incompressible Navier-Stokes Equations	The LDLT factorization and new extensions for saddle point system preconditioning
# 2	**Minisymposium 4: Preconditioners for Model Order Reduction** *[Chair: Kapil Ahuja]*			
room KH 2-260	10:30am -- 11:00am	11:00am -- 11:30am	11:30am -- 12:00pm	12:00pm -- 12:30pm
	Kapil Ahuja	Navneet P. Singh	Eric de Sturler	Heidi Thornquist
	Preconditioned Linear Solves for Parametric Model Order Reduction	Preconditioner Updates in Adaptive Iterative Rational Global Arnoldi Algorithm	Updating Preconditioners using Krylov Subspace Information	The Art of Preconditioners for Circuit Simulation
# 3	**Minisymposium 5: Structured preconditioning (Session 1)** *[Chair: Yuanzhe Xi]*			
room KH 3-210	10:30am -- 11:00am	11:00am -- 11:30am	11:30am -- 12:00pm	12:00pm -- 12:30pm
	Geoffrey Dillon	Yuanzhe Xi	Kees Vuik	Mikhail Lepilov
	Preconditioners for a Fractional Differential Equation on a Composite Mesh	Fast Contour Integral Preconditioner for Solving 3D High-frequency Helmholtz Equations	Scalable Solvers using Two-Level Deflation for the Helmholtz Equation	Hierarchical SIF preconditioners for sparse SPD matrices
12:30pm--2:00pm ***Lunch Break***				

Invited Presentation - IP6 ***[Chair: Edmond Chow, Room: KH 3-180]***				
2:00pm -- 2:45pm	Xiaoye Li	(IP) A factorization based framework for building scalable algebraic preconditioners		
2:45 -- 3:15pm Coffee Break				
# 1	**Minisymposium 6: Recent Advances in Multigrid Methods and Their Applications (Session 1)** ***[Chair: Xiaozhe Hu]***			
room KH 3-180	3:15pm -- 3:45pm	3:45pm -- 4:15pm	4:15pm -- 4:45pm	4:45pm -- 5:15pm
	Ruipeng Li	Yunhui He	Salvatore Filippone	Xiaozhe Hu
	Recent Development of Multigrid Solvers in HYPRE on Modern Heterogeneous Computing Platforms	A Local Fourier Analysis for Additive Vanka Relaxation	Efficient algebraic multigrid for scalable scientific simulation	Robust preconditioners for mixed-dimensional models of flow in fractured porous media
# 2	**Contributed Presentations 5: Preconditioners for special problems** ***[Chair: Jianlin Xia]***			
room KH 2-260	3:15pm -- 3:45pm	3:45pm -- 4:15pm	4:15pm -- 4:45pm	
	Matthias Bollhofer	Sean Hon	Katarzyna Swirydowicz	
	Large-Scale Sparse Inverse Covariance Matrix Estimation and Its Applications	Band-Toeplitz preconditioners for ill-conditioned Toeplitz systems	Low-synch Gram-Schmidt projection schemes applied to GMRES-AMG moving mesh solvers	
# 3	**Minisymposium 7: Preconditioners for Fluid Problems (Session 1)** ***[Chair: Thomas Roy]***			
room KH 3-210	3:15pm -- 3:45pm	3:45pm -- 4:15pm	4:15pm -- 4:45pm	4:45pm -- 5:15pm
	Massimiliano Ferronato	Scott MacLachlan	Robert C. Kirby	Patrick E. Farrell
	A class of block preconditioners for the solution of fluid flow problems in deformable porous media	Boundary-layer preconditioners for singularly perturbed convection-diffusion equations	Preconditioners for Fluid Problems: Software infrastructure for coupled fluids preconditions	Augmented Lagrangian preconditioners for nematic liquid crystals
7:00pm -- 9:00pm ***Conference Banquet*** **Pinnacle Ballroom At The Graduate Hotel** **Directions**				

Schedule for Day 3: July 3, 2019

# 1	**Contributed Presentations 6: Convergence Theory** ***[Chair: Yuanzhe Xi]***	
room KH 3-180	8:30am -- 9:00am	9:00am -- 9:30am
	Massimiliano Lupo Pasini	Thai Anh Nhan
	Convergence analysis of Anderson-type acceleration of Richardson's iteration	Preconditioning-based techniques for the convergence analysis of singularly perturbed convection-diffusion problems
# 2	**Contributed Presentations 7: Nonlinear and Eigenvalue problems** ***[Chair: Eric De Sturler]***	
room KH 2-260	8:30am -- 9:00am	9:00am -- 9:30am
	Xiao-Chuan Cai	Yunkai Zhou
	Nonlinear Preconditioning and Applications	Shift-without-invert and Shift-invert Techniques in Spectrum-partition for Accelerating Eigenvalue Calculations
# 3	**Contributed Presentations 8: MISC** ***[Chair: Jie Chen]***	
room KH 3-210	8:30am -- 9:00am	9:00am -- 9:30am
	Daniel Bielich	Stefano Cipolla
	Revisiting Householder orthogonalization	Low complexity matrix projections preserving actions on vectors

9:30 -- 9:45am Coffee Break

Invited Presentation - IP7 ***[Chair: Kees Vuik, Room: KH 3-180]***		
9:45am -- 10:30am	Vicki Howle	(IP) Block Preconditioning for Implicit Runge-Kutta Methods for Time-Dependent PDE Problems

# 1	**Minisymposium 5: Structured preconditioning (Session 2)** ***[Chair: Yuanzhe Xi]***			
room KH 3-180	10:30am -- 11:00am	11:00am --11:30pm	11:30pm -- 12:00pm	12:00pm -- 12:30pm
	Chao Chen	Jie Chen	Jianlin Xia	James Nagy
	A Robust Hierarchical Solver for Ill-conditioned Systems with Applications to Ice Sheet Modeling	Linear-Cost Covariance Functions for Gaussian Random Fields	Effective eSIF Preconditioners with Guaranteed Positive Definiteness for General SPD Matrices	Preconditioning of flexible Krylov methods for low rank image reconstruction
# 2	**Minisymposium 6: Recent Advances in Multigrid Methods and Their Applications (Session 2)** ***[Chair: Xiaozhe Hu]***			
room KH 2-260	10:30am -- 11:00am	11:00am --11:30pm	11:30pm -- 12:00pm	12:00pm -- 12:30pm
	Irad Yavneh	Ray Tuminaro	Peter Ohm	Ludmil Zikatanov
	Accelerating Multigrid via Sequential Subspace Optimization (SESOP)	Algebraic Multigrid for Hypersonic Simulations	Monolithic multigrid for a stabilized discretizations of the poroelastic equations	An auxiliary space preconditioner for mixed finite element discretizations of elliptic equations
# 3	**Minisymposium 7: Preconditioners for Fluid Problems (Session 2)** ***[Chair: Patrick Farrell]***			
room KH 3-210	10:30am -- 11:00am	11:00am --11:30pm	11:30pm -- 12:00pm	12:00pm -- 12:30pm
	John N. Shadid	Johann Rudi	Martin Stoll	Thomas Roy
	Scalable Block Preconditioning Methods for Solution of Implicit / IMEX Finite Element Continuum Plasma Physics Models	An Optimization-Based Perturbed Newton Method for Viscoplastic Fluids with von Mises Yielding	Low-rank solvers and preconditioning for unsteady an Stokes-Brinkman optimal control problem with random data	Two-stage preconditioners for non-isothermal flow in porous media