

---

## Contents

---

### Part I Plenary Presentations

---

<b>A Domain Decomposition Approach for Calculating the Graph Corresponding to a Fibrous Geometry</b> <i>Achi Brandt, Oleg Iliev, Joerg Willems</i> . . . . .	3
<b>Adaptive Multilevel Interior-Point Methods in PDE Constrained Optimization</b> <i>Harbir Antil, Ronald H.W. Hoppe, Christopher Linsenmann</i> . . . . .	15
<b>Numerical Homogenisation Technique with Domain Decomposition Based a-posteriori Error Estimates</b> <i>Patrick Le Tallec</i> . . . . .	27
<b>Multiscale Methods for Multiphase Flow in Porous Media</b> <i>Jan M. Nordbotten</i> . . . . .	39
<b>Mixed Plane Wave Discontinuous Galerkin Methods</b> <i>Ralf Hiptmair, Ilaria Perugia</i> . . . . .	51
<b>Numerical Zoom and the Schwarz Algorithm</b> <i>Frédéric Hecht, Alexei Lozinski, Olivier Pironneau</i> . . . . .	63
<b>BDDC for Nonsymmetric Positive Definite and Symmetric Indefinite Problems</b> <i>Xuemin Tu, Jing Li</i> . . . . .	75
<b>Accommodating Irregular Subdomains in Domain Decomposition Theory</b> <i>Olof B. Widlund</i> . . . . .	87
<b>Auxiliary Space Preconditioners for Mixed Finite Element Methods</b> <i>Ray S. Tuminaro, Jinchao Xu, Yunrong Zhu</i> . . . . .	99

---

**Part II Minisymposia**

---

<b>A Multilevel Domain Decomposition Solver Suited to Nonsmooth Mechanical Problems</b>	
<i>Damien Iceta, Pierre Alart, David Dureisseix</i> . . . . .	113
<b>A FETI-2LM Method for Non-Matching Grids</b>	
<i>François-Xavier Roux</i> . . . . .	121
<b>Truncated Nonsmooth Newton Multigrid Methods for Convex Minimization Problems</b>	
<i>Carsten Gräser, Uli Sack, Oliver Sander</i> . . . . .	129
<b>A Recursive Trust-Region Method for Non-Convex Constrained Minimization</b>	
<i>Christian Groß, Rolf Krause</i> . . . . .	137
<b>A Robin Domain Decomposition Algorithm for Contact Problems: Convergence Results</b>	
<i>Mohamed Ipopa, Taoufik Sassi</i> . . . . .	145
<b>Patch Smoothers for Saddle Point Problems with Applications to PDE-Constrained Optimization Problems</b>	
<i>René Simon, Walter Zulehner</i> . . . . .	153
<b>A Domain Decomposition Preconditioner of Neumann-Neumann Type for the Stokes Equations</b>	
<i>Vitorita Dolean, Frédéric Nataf, Gerd Rapin</i> . . . . .	161
<b>Non-overlapping Domain Decomposition for the Richards Equation via Superposition Operators</b>	
<i>Heiko Berninger</i> . . . . .	169
<b>Convergence Behavior of a Two-Level Optimized Schwarz Preconditioner</b>	
<i>Olivier Dubois, Martin J. Gander</i> . . . . .	177
<b>An Algorithm for Non-Matching Grid Projections with Linear Complexity</b>	
<i>Martin J. Gander, Caroline Japhet</i> . . . . .	185
<b>A Maximum Principle for <math>L^2</math>-Trace Norms with an Application to Optimized Schwarz Methods</b>	
<i>Sébastien Loisel, Daniel B. Szyld</i> . . . . .	193
<b>An Extended Mathematical Framework for Barrier Methods in Function Space</b>	
<i>Anton Schiela</i> . . . . .	201

<b>Optimized Schwarz Preconditioning for SEM Based Magnetohydrodynamics</b> <i>Amik St-Cyr, Duane Rosenberg, Sang Dong Kim</i> . . . . .	209
<b>Nonlinear Overlapping Domain Decomposition Methods</b> <i>Xiao-Chuan Cai</i> . . . . .	217
<b>Optimized Schwarz Waveform Relaxation: Roots, Blossoms and Fruits</b> <i>Laurence Halpern</i> . . . . .	225
<b>Optimized Schwarz Methods</b> <i>F. Nataf</i> . . . . .	233
<b>The Development of Coarse Spaces for Domain Decomposition Algorithms</b> <i>Olof B. Widlund</i> . . . . .	241
<hr/>	
<b>Part III Contributed Presentations</b>	
<hr/>	
<b>Distributed Decomposition Over Hyperspherical Domains</b> <i>Aron Ahmadi, David Keyes, David Melville, Alan Rosenbluth, Kehan Tian</i> . . .	251
<b>Domain Decomposition Preconditioning for Discontinuous Galerkin Approximations of Convection-Diffusion Problems</b> <i>Paola F. Antonietti, Endre Süli</i> . . . . .	259
<b>Linearly Implicit Domain Decomposition Methods for Nonlinear Time-Dependent Reaction-Diffusion Problems</b> <i>A. Arrarás, L. Portero, J.C. Jorge</i> . . . . .	267
<b>NKS for Fully Coupled Fluid-Structure Interaction with Application</b> <i>Andrew T. Barker, Xiao-Chuan Cai</i> . . . . .	275
<b>Weak Information Transfer between Non-Matching Warped Interfaces</b> <i>Thomas Dickopf, Rolf Krause</i> . . . . .	283
<b>Computational Tool for a Mini-Windmill Study with SOFT</b> <i>M. Garbey, M. Smaoui, N. De Brye, C. Picard</i> . . . . .	291
<b>On Preconditioners for Generalized Saddle Point Problems with an Indefinite Block</b> <i>Piotr Krzyżanowski</i> . . . . .	299
<b>Lower Bounds for Eigenvalues of Elliptic Operators by Overlapping Domain Decomposition</b> <i>Yuri A. Kuznetsov</i> . . . . .	307

<b>From the Boundary Element Domain Decomposition Methods to Local Trefftz Finite Element Methods on Polyhedral Meshes</b> <i>Dylan Copeland, Ulrich Langer, David Pusch</i> . . . . .	315
<b>An Additive Neumann-Neumann Method for Mortar Finite Element for 4th Order Problems</b> <i>Leszek Marcinkowski</i> . . . . .	323
<b>A Numerically Efficient Scheme for Elastic Immersed Boundaries</b> <i>F. Pacull, M. Garbey</i> . . . . .	331
<b>A Domain Decomposition Method Based on Augmented Lagrangian with a Penalty Term</b> <i>Chang-Ock Lee, Eun-Hee Park</i> . . . . .	339
<b>Parallelization of a Constrained Three-Dimensional Maxwell Solver</b> <i>F. Assous, J. Segré, E. Sonnendrücker</i> . . . . .	347
<b>A Discovery Algorithm for the Algebraic Construction of Optimized Schwarz Preconditioners</b> <i>Amik St-Cyr, Martin J. Gander</i> . . . . .	355
<b>On the Convergence of Optimized Schwarz Methods by way of Matrix Analysis</b> <i>Sébastien Loisel, Daniel B. Szyld</i> . . . . .	363

Domain Decomposition Methods in Science and  
Engineering XVIII

BERCOVIER, M.; Gander, M.; Kornhuber, R.; Widlund, O.  
(Eds.)

2009, XVI, 376 p. 81 illus., Hardcover

ISBN: 978-3-642-02676-8