

Marcus J. Grote

Professor of Numerical Analysis and
Computational Mathematics

Mathematisches Institut, Universität Basel
Spiegelgasse 1, CH-4051 Basel, Switzerland

EDUCATION

1990–1995 **Stanford University**, USA
Ph.D. in Scientific Computing and Computational Mathematics,
graduated Spring 95. Advisor: Professor Joseph B. Keller.
Dissertation: "Nonreflecting Boundary Conditions"
Ph.D. minor in Mathematics,
Ph.D. minor in Mechanical Engineering.

1985–1990 **Université de Genève**, Geneva, Switzerland
Diplôme de mathématicien, equivalent to an M.S. in Mathematics.
Advisor: Professor Gerhard Wanner.

1985–1990 **Université de Genève**, Geneva, Switzerland
Diplôme d'informaticien, equivalent to an M.S. in Computer Science.

HONORS AND AWARDS

Spring 2001 Offered the Chair of Numerical Analysis (C-4 Professur) at the L.-M.-Universität München, Munich, Germany. Declined May 2001.

1993–1995 *IBM graduate fellowship*, nationwide(USA) competition

August 1992 **IMA**, University of Minnesota
Competitive admission to a four week workshop on mathematical modeling in engineering science and industry

1990–1991 *Graduate fellowship*, School of Engineering, Stanford University

PROFESSIONAL APPOINTMENTS

2001–present **Department of Mathematics, Universität Basel**, Basel, Switzerland
Professor of Numerical analysis and computational mathematics.

2017–2018 **EPFL**, Lausanne, Switzerland
Visiting professor, on sabbatical leave.

2008–2009 **Courant Institute, NYU**, New York, USA
Visiting professor, on sabbatical leave.

2004–2005 **Courant Institute, NYU**, New York, USA
Visiting professor, on sabbatical leave.

1997–2001 **Department of Mathematics, ETH**, Zürich, Switzerland
Assistant professor.

1995–1997 **Courant Institute of Mathematical Sciences**, New York
Associate research scientist. Post-doctoral position under Prof. Andrew Majda.

Summer 1993 **U.C. San Francisco**, San Francisco, California
Research assistant. Collaborated with Prof. David A. Agard, Department of Biochemistry. Implemented a complete volume rendering algorithm for the display and analysis of three-dimensional biological images coming from confocal microscopy.

Summer 1992 **NASA Ames**, Moffett Field, California

Research assistant. Continued the work started in summer 1991 with Dr. Horst Simon on the Connection Machine CM-2. Combined the preconditioner with an iterative solver, and applied the method to an extensive set of test problems coming from scientific and industrial applications.

Summer 1991 **NASA Ames**, Moffett Field, California

Research assistant. Collaborated with Dr. Horst Simon. Implemented a parallel preconditioner for the iterative solution of large linear systems on the Connection Machine CM-2.

INVITED TALKS

Nov. 2017 *ETHZ*, Zurich, on High-order local time-stepping methods

Oct. 2017 *University of Vienna*, Austria, on High-order local time-stepping methods

Aug. 2017 *UPMC, Paris VI*, France, workshop Numerical methods for wave propagation

Aug. 2017 *ENSTA ParisTech*, France, workshop in honor of P. Joly's 60th birthday

Mar. 2017 *University of Stuttgart*, Germany, plenary speaker at HONOM 2017

Mar. 2017 *Oberwolfach*, Germany, meeting on Space-time methods for time-dependent PDEs

Sept. 2016 *Univ. of Nice*, France, workshop on Coupling problems from physics and engineering

Mar. 2016 *University of Pau*, France, plenary speaker at JOSO 2016

Dec. 2015 *University of Heidelberg*, workshop on Advances in DG methods and related topics

Nov. 2015 *University of Geneva*, Switzerland, on high-order local time-stepping

Sept. 2015 *University of Halle-Wittenberg*, Germany, plenary speaker at NUMDIFF-14

Oct. 2014 *University of Bern*, Switzerland, on local time-stepping

Oct. 2014 *EPFL*, Lausanne, keynote speaker at CADMOS Day 2014

May 2014 *Glasgow*, UK, NAIS workshop on Challenges in medical imaging

May 2014 *Edinburgh*, UK, NAIS workshop on Multiscale methods and HPC

June 2013 *Tunis*, Tunisia, plenary speaker at WAVES 2013 conference

Jan. 2013 *Oberwolfach*, Germany, meeting on Computational Electromagnetics and Acoustics

Nov. 2012 *University of Mulhouse*, France, EUCOR seminar, on local-time stepping.

Oct. 2012 *Prague*, Czech Republic, EUROMECH Colloq. Adv. Model. of Wave Propagation

May 2012 *Heraklion*, Crete, ACMAC workshop on Wave Propagation in Complex Media

Mar. 2012 *University of Metz*, France, "Journées de Metz" on Wave Propagation, on local-time stepping.

Feb. 2012 *Oberwolfach*, Germany, meeting on Discontinuous Galerkin Methods

Nov. 2011 *Linz*, Austria, RICAM Workshop on Wave Propagation and Scattering

Oct. 2011 *Freudenstadt*, Germany, KIT workshop on Wave Phenomena

Sept. 2011 *Würzburg*, Germany, ESF-OPTPDE meeting on Fast Solvers for Wave Propagation

Apr. 2011 *Uppsala University*, Sweden, on FE-HMM for wave propagation.

Sept. 2010 *Cambridge*, UK, on Next generation numerical methods for computational wave propagation.

Aug. 2010 *Oberwolfach*, Germany, meeting on Math. Th. and Model. in Atm.-Ocean Science

Jun. 2010 *Stanford University*, USA, on FE-HMM for wave propagation.

Feb. 2010	<i>Oberwolfach</i> , Germany, meeting on Computational Electromagnetics and Acoustics
Oct. 2009	<i>EPFL</i> , Lausanne, on DG-FEM and local time-stepping
Mar. 2009	<i>Edinburgh</i> , UK, ICMS workshop on Multiscale algorithms
Jan. 2009	<i>ICCAM conference</i> , Shanghai, on ABC and multiple scattering
Dec. 2008	<i>Courant Institute</i> , USA, winter school “Real Time Filtering”
Nov. 2008	<i>University of Delaware</i> , USA, on DG-FEM and local time-stepping
Jun. 2008	<i>FoCM 2008 conference</i> , Hong-Kong, on DG-FEM and local time-stepping
Jun. 2008	<i>Chinese Acad. of Sciences</i> , Peking, on Multiple scattering
Nov. 2007	<i>BIRS</i> , Banff, Canada, meeting on DG-FEM
Nov. 2007	<i>Université Louis Pasteur</i> , Strasbourg, on DG-FEM and local time-stepping
Apr. 2007	<i>Lawrence Livermore Nat. Lab.</i> , USA, on DG-FEM and local time-stepping
Mar. 2007	<i>Stanford 50 conference</i> , USA, on Multiple scattering and DG-FEM
Mar. 2007	<i>Universität Innsbruck</i> , Austria, on DG-FEM and local time stepping
Feb. 2007	<i>Oberwolfach</i> , Germany, meeting on Computational Electromagnetics and Acoustics
Nov. 2006	<i>INRIA, Rocquencourt</i> , France, winter school “Ecole des Ondes” on DG-FEM
Aug. 2006	<i>Oberwolfach</i> , Germany, meeting on Math. Th. and Model. in Atm.-Ocean Science
May 2006	<i>Universität Zürich</i> , Switzerland, on Multiple scattering and DG-FEM
Mar. 2006	<i>Université de Genève</i> , Switzerland, on Multiple scattering and DG-FEM
Jan. 2006	<i>Université de Fribourg</i> , Switzerland, on Multiple scattering and DG-FEM
Nov. 2005	<i>Universität Karlsruhe</i> , Germany, on Multiple scattering and DG-FEM
Nov. 2005	<i>Techn. Universität München</i> , Germany, on Multiple scattering and DG-FEM
Mar. 2005	<i>University of Delaware</i> , USA, on Multiple scattering
Mar. 2005	<i>NJIT</i> , USA, on Multiple scattering
Mar. 2005	<i>Stanford University</i> , USA, on Multiple scattering
Feb. 2005	<i>Courant Institute</i> , USA, on Multiple scattering
Feb. 2005	<i>Columbia University</i> , USA, on Multiple scattering
Jul. 2004	<i>WIAS Berlin</i> , Germany, Nonreflecting boundary conditions
Feb. 2004	<i>Oberwolfach</i> , Germany, meeting on Computational Electromagnetics
May 2003	<i>Universität Münster</i> , Germany, on Wave propagation in unbounded media
Dec. 2002	<i>Université de Haute-Alsace, Mulhouse</i> , France, on Wave prop. in unbound. med.
Aug. 2002	<i>Oberwolfach</i> , Germany, meeting on Math. Th. and Model. in Atm.-Ocean Science
Mar. 2002	<i>HYP 2002 conference</i> , Caltech, CA, on Nonreflecting boundary conditions
July 2001	<i>Universität Freiburg i. Br.</i> , Germany, on Nonreflecting boundary conditions
Jan. 2001	<i>RWTH Aachen</i> , Germany, on Parallel preconditioning with approximate inverses
Aug. 2000	<i>PMAA 2000 meeting</i> , Switzerland, tutorial on the SPAI Algorithm
June 2000	<i>Universität Heidelberg</i> , Germany, on Nonreflecting boundary conditions
Mar. 2000	<i>Université de Rennes</i> , France, on Modeling geophysical flows via statistical theory
Feb. 2000	<i>EPFL</i> , Switzerland, on Nonreflecting boundary conditions
Dec. 1999	<i>L.-M.-Universität München</i> , Germany, on Nonreflecting boundary conditions

Dec. 1999 *Universität Zürich*, Switzerland, on Nonreflecting boundary conditions

Dec. 1999 *Universität Basel*, Switzerland, on Nonreflecting boundary conditions

June 1999 *Oberwolfach*, Germany, meeting on Fast Solvers for PDE's

Feb. 1999 *Techn. Universität München*, Germany, on Nonreflecting boundary conditions

Jan. 1999 *Université de Fribourg*, Switzerland, on Nonreflecting boundary conditions

June 1998 *ETH Zürich*, Switzerland, on Modeling large scale geophysical flows

June 1998 *Oxford University*, UK, on Nonreflecting boundary conditions

June 1998 *Oxford University*, UK, on Parallel preconditioning

May 1998 *Universität Tübingen*, Germany, on Nonreflecting boundary conditions

Dec. 1997 *Courant Institute, NY*, on Large and small scale interaction via topographic stress

Nov. 1997 *Universität Göttingen*, Germany, on Nonreflecting boundary conditions

March 1997 *ETH, Zürich*, Switzerland, on Nonreflecting boundary conditions

April 1996 *University of Maryland, MD*, on Nonreflecting boundary conditions

Feb. 1996 *NJIT, Institute of Technology, NJ*, on Nonreflecting boundary conditions

Nov. 1995 *AT&T, Bell Labs, NJ*, on Nonreflecting boundary conditions

Nov. 1995 *Courant Institute, NY*, on Nonreflecting boundary conditions

Aug. 1995 *Swiss Center for Supercomputing (CSCS)*, on Parallel preconditioning

TEACHING EXPERIENCE

Fall 2001– **Universität Basel**

Since Fall 2001, teaching undergraduate and graduate level courses in Linear Algebra, Numerical Analysis, Applied Analysis, etc.

Responsible for a “Mathematics laboratory” course at the computer on the use of Maple, Matlab, LaTex, C.

PH.D. THESES DIRECTED

Oct. 2018– Y. Gleichmann, *Adaptive strategies for time-dependent inverse scattering problems*, ongoing work.

Feb. 2017– S. Michel, *Uncertainty quantification and local time-stepping for the wave equation*, ongoing work.

Feb. 2015– J.-H. Tang, *Control methods for forward and inverse scattering problems*, ongoing work.

Oct. 2016 U. Nahum, *Adaptive eigenspace for inverse problems in the frequency domain*

May 2015 M. Mehlin, *Efficient explicit time integration for the simulation of acoustic and electromagnetic waves*

May 2013 Ch. Stohrer, *Finite element heterogeneous multiscale methods for the wave equation* (joint work with A. Abdulle, EPFL)

April 2013 J. Huber, *Interior point methods for PDE-constrained optimization*, (joint work with O. Schenk, USI)

June 2009 I. Sim, *Nonreflecting boundary conditions for time-dependent wave propagation*

March 2009 V. Palumberi, *Mathematical modeling and simulation of cell populations*

July 2006 A. Schneebeli, *Interior penalty discontinuous Galerkin methods for electromagnetic and acoustic wave equations*

April 2005 C. Kirsch, *Nonreflecting boundary conditions for the numerical solution of wave propagation problems in unbounded domains*

May 2003 O. Bröker, *Parallel Multigrid Methods using Sparse Approximate Inverses*, (Dept. of Computer Science, ETH Zürich)

NUMERICAL SOFTWARE

June 1994 *SPAI*, SParse Approximate Inverse preconditioner, FORTRAN 77 version, joint work with Prof. T. Huckle, TU-München,
see <ftp://simplicity.Stanford.EDU/pub/grote/spai/>

May 1999 *SPAI Version 3.0*, C/MPI parallel version, PETSc interface, Matlab interface, joint work with S. Barnard, NASA Ames Research Center,
see <http://www.sam.math.ethz.ch/~grote/spai/>

Mar. 2006 *SPAI Version 3.2*, auto configure installation and fixed sparsity added, new Matlab functions *spaidiags*, *spaitau* added, joint work with O. Bröker and M. Hagemann,
see <http://www.computational.unibas.ch/software/spai/>

SPECIAL SKILLS

Bilingual in French and German, fluent in English.

Experienced in FORTRAN, C, Unix, L^AT_EX, Matlab, and Mathematica.

Parallel programming experience on the Connection Machine CM-2, on the SGI/Cray SV-1, and on the NEC SX-4.

PROFESSIONAL ACTIVITIES

Aug. 2019 **WAVES 2019**, Vienna, Austria, member of the scientific committee.

Sept. 2017 **ENUMATH 2017**, Voss, Norway, member of the scientific committee.

Apr. 2017 **Schweizer Numerik Kolloquium**, Swiss NA-day 2017 in Basel, member of the organizing committee.

Aug. 2013 **ENUMATH 2013**, EPFL, Lausanne, member of the scientific committee.

Aug. 2013 **JBK@90 Workshop**, EPFL, Lausanne, in honor of J. B. Keller's 90th birthday, member of the organizing committee.

May 2011 **ProDoc Mini-course**, On PDE-Constrained Optimization (by Prof. E. Haber, UBC, Canada), member of the organizing committee.

Apr. 2009 **Schweizer Numerik Kolloquium**, Swiss NA-day 2009 in Basel, member of the organizing committee.

July 2007 **ICIAM07**, Internat. Congress on Industrial and Applied Mathematics, Zurich, Switzerland, member of the scientific committee.

June 2004 **CANUM04**, Congrès National d'Analyse Numérique, Obernai, France, member of the scientific committee.

June 2003 **BASNUM03**, Spring Meeting of the Swiss Mathematical Society, organizer (with D. Schötzau).

Nov. 2002 **PMAA 2002**, Neuchâtel, Switzerland
Member of the organizing committee.
Minisymposium on Parallel Algebraic Multigrid Methods (with O. Schenk)

July 2001 **AMCW01**, Berlin, Germany
Organized two minisymposia:
Statistical mechanics models for the atmosphere and ocean (with. A. Majda);
Numerical methods for wave propagation in unbounded media (with F. Schmidt)

Feb. 2001 **GAMM 2001**, ETH Zürich, member of the organizing committee

Aug. 2000 **PMAA 2000**, Neuchâtel, Switzerland
Organized a minisymposium on Sparse approximate inverses at the International workshop on parallel matrix algorithms and applications (with P. Arbenz, ETHZ)

July 1999 **ENUMATH 99**, Jyväskylä, Finland
Organized a minisymposium on Mathematical and numerical modeling in atmosphere-ocean science (with A. Majda)

1997–2001 Member of the committee responsible for inviting guests for post-graduate lectures at the ETH Zürich

1997–present Acting referee for *SIAM Journal on Scientific Computing*, *SIAM Journal on Applied Mathematics*, *SIAM Journal on Numerical Analysis*, *SIAM Journal on Matrix Analysis*, *Journal of Computational Physics*, *Numerische Mathematik*, *Journal of the Acoustical Society of America*, *Computer Methods in Applied Mechanics and Engineering*, *European Journal of Applied Mathematics*, *Mathematics and Computers in Simulation*, *High Performance Computing Applications*, *ZAMP*

JOURNAL PUBLICATIONS

- (with J.-H. Tang) *On Controllability Methods for the Helmholtz Equation*, J. Comp. Appl. Math., DOI: 10.1016/j.cam.2019.03.016 (2019).
- (with D. Baffet) *On Wave Splitting, Source Separation and Echo Removal with Absorbing Boundary Conditions*, J. Comp. Physics 387, pp. 589–596 (2019).
- (with U. Nahum) *Adaptive Eigenspace for Multi-Parameter Inverse Scattering Problems*, Comp. Math. Applic., DOI: 10.1016/j.camwa.2019.02.005 (2019).
- (with M. Mehlin and S. Sauter) *Convergence Analysis of Energy Conserving Explicit Local Time-stepping Methods for the Wave Equation*, SIAM Num. Anal. 56, pp. 994–1021 (2018).
- (with A. Abdulle and O. Jecker) *FE-HMM for Elastic Waves in Heterogeneous Media*, Comp. Meth. Appl. Mech. Engin. 335, pp. 1–23 (2018).
- (with M. Kray and U. Nahum) *Adaptive Eigenspace Method for Inverse Scattering Problems in the Frequency Domain*, Inverse Problems 33, pp. 025006 (2017).
- (with D. Peter, M. Rietmann and O. Schenk) *Newmark Local Time Stepping on High-Performance Computing Architectures*, J. Comp. Physics 334, pp. 308–326 (2017).
- (with M. Kray, F. Nataf and F. Assous) *Time-dependent Wave Splitting and Source Separation*, J. Comp. Physics 330, pp. 981–996 (2017).
- (with J. Diaz) *Multilevel Explicit Local Time-stepping For Second-order Wave Equations*, Comp. Meth. Appl. Mech. Engin., 291, pp. 240–265 (2015).
- (with M. Kray, F. Nataf and F. Assous) *Wave Splitting for Time-dependent Scattered Field Separation*, C. R. Acad. Sci. Paris, Ser. I, 353, pp. 523–527 (2015).
- (with M. Mehlin and T. Mitkova) *Runge-Kutta Based Explicit Local Time-Stepping Methods for Wave Propagation*, SIAM J. Sc. Computing 37, pp. A747–A775 (2015).
- (with A. Abdulle and Ch. Stohrer) *Finite Element Heterogeneous Multiscale Method for the Wave Equation: Long Time Effects*, SIAM J. Multiscale Modeling and Simulation 12, pp. 1230–1257 (2014).
- (with J. Huber, D. Kourounis and O. Schenk) *Inexact Interior-Point Method for PDE-Constrained Nonlinear Optimization*, SIAM J. Sc. Computing 36, pp. A1251–1276 (2014).
- (with A. Abdulle and Ch. Stohrer) *FE Heterogeneous Multiscale Method for Long Time Wave Propagation*, C. R. Acad. Sci. Paris, Ser. I, 351, pp. 495–499 (2013).
- (with T. Mitkova) *High-Order Explicit Local Time Stepping For Damped Wave Equations*, J. Comp. Appl. Math. 239, pp. 270–289 (2013).
- (with A. Abdulle) *Finite Element Heterogeneous Multiscale Method for the Wave Equation*, SIAM J. Multiscale Modeling and Simulation 9, pp. 766–792 (2011).
- (with I. Sim) *Local Nonreflecting Boundary Condition for Time Dependent Multiple Scattering*, J. Comp. Phys. 230, pp. 3135–3154 (2011).
- (with V. Palumberi, B. Wagner, A. Barbero and I. Martin) *Dynamic Formation of Oriented Patches in Chondrocyte Cell Cultures*, J. Math. Biol. 63, pp. 757–777 (2011).
- (with T. Mitkova) *Explicit Local Time Stepping For Maxwell's Equations*, J. Comp. Appl. Math. 234, pp. 3283–3302 (2010).
- (with L. Beilina) *Adaptive Hybrid Finite Element/Difference Method for Maxwell's Equations*, TWMS J. Pure Appl. Math 1, pp. 176–198 (2010).

- (with M. Bollhöfer and O. Schenk) *Algebraic Multilevel Preconditioner for the Helmholtz Equation in Heterogeneous Media*, SIAM J. Sc. Computing 31, pp. 3781–3805 (2009).
- (with I. Sim) *On Local Nonreflecting Boundary Conditions for Time Dependent Wave Propagation*, Chinese Ann. Math. Ser. B, vol. 30, pp. 589–606 (2009).
- (with A.J. Majda) *Mathematical test models for superparametrization in anisotropic turbulence*, Proc. Natl. Acad. Sci. USA, 106, pp. 5470–5474 (2009).
- (with J. Diaz) *Energy Conserving Explicit Local Time-stepping For Second-order Wave Equations*, SIAM J. Sc. Computing, vol. 31, pp. 1985–2014 (2009).
- (with D. Schötzau) *Optimal Error Estimates for the Fully Discrete Interior Penalty DG Method for the Wave Equation*, J. Sc. Computing, vol. 40, pp. 257–272 (2009).
- (with A. Schneebeli and D. Schötzau) *Interior Penalty Discontinuous Galerkin Method for Maxwell’s Equations: Optimal L^2 -Norm Error Estimates*, IMA J. Numer. Analysis 28, pp. 440–468 (2008).
- (with A.J. Majda) *Explicit Off-line Test Criteria for Stable Accurate Time Filtering of Strongly Unstable Spatially Extended Systems*, Proc. Natl. Acad. Sciences 104, pp. 1124–1129 (2007).
- (with C. Kirsch) *Nonreflecting Boundary Conditions for Time Dependent Multiple Scattering*, J. Comp. Physics 221, pp. 41–62 (2007).
- (with A. Schneebeli and D. Schötzau) *Interior Penalty Discontinuous Galerkin Method for Maxwell’s Equations: Energy Norm Error Estimates*, J. Comput. Appl. Math. 204, pp. 375–386 (2007).
- (with A. Schneebeli and D. Schötzau) *Discontinuous Galerkin Finite Element Method For The Wave Equation*, SIAM J. Num. Analysis, 44, pp. 2408–2431 (2006).
- (with A.J. Majda) *Stable Time Filtering of Strongly Unstable Spatially Extended Systems*, Proc. Natl. Acad. Sciences, 103, pp. 7548–7553 (2006).
- *Local Nonreflecting Boundary Conditions for Maxwell’s Equations*, Comput. Methods Appl. Mech. Engrg. 195, pp. 3691–3708 (2006).
- (with A. Barbero, V. Palumberi, B. Wagner, et al.) *Experimental and Mathematical Study of the Influence of Growth Factors on the Growth Kinetics of Adult Human Articular Chondrocytes*, J. Cell. Physiology 204, pp. 830–838 (2005).
- (with C. Kirsch) *Dirichlet-to-Neumann Boundary Conditions for Multiple Scattering Problems*, J. Comp. Phys. 201, pp. 630–650 (2004).
- (with W. Bangerth and C. Hohenegger) *Finite Element Method for Time Dependent Scattering: Nonreflecting Boundary Conditions, Adaptivity, and Energy Decay*, Comp. Meth. Appl. Mech. Engrg. 193, pp. 2453–2482 (2004).
- (with G. Gächter) *Dirichlet-to-Neumann Map for Three-Dimensional Elastic Waves*, Wave Motion, vol. 37/3, pp. 293–311 (2003).
- (with O. Bröker) *Sparse Approximate Inverse Smoothers For Geometric and Algebraic Multigrid*, Appl. Num. Math. 41, pp. 61–80 (2002).
- (with O. Bröker, C. Mayer, and A. Reusken) *Robust Parallel Smoothing for Multigrid via Sparse Approximate Inverses*, SIAM J. Sc. Comput. 23, pp. 1396–1417 (2001).
- (with M.T. DiBattista and A.J. Majda) *Meta-stability of Equilibrium Statistical Structures for Prototype Geophysical Flows with Damping and Driving*, Physica D: 151, 271–304 (2001).

- *Nonreflecting Boundary Condition for Elastodynamic Scattering*, J. Comput. Phys. 161, 331–353 (2000).
- (with A.J. Majda) *Crude Closure for Flow with Topography Through Large Scale Statistical Theory*, Nonlinearity 13, 569–600 (2000).
- *Am Rande des Unendlichen – Numerische Verfahren für unbegrenzte Gebiete*, (Numerical methods for unbounded domains, in German), Elem. Math. 55, 67–83 (2000).
- (with J.B. Keller) *Exact Nonreflecting Boundary Condition for Elastic Waves*, SIAM J. Appl. Math. 60, 803–819 (2000).
- *Nonreflecting Boundary Conditions for Electromagnetic Scattering*, Int. J. Numer. Model. 13, 397–416 (2000). (Special issue on absorbing boundary conditions for computational electromagnetics).
- (with A.J. Majda, and C. Ragazzo) *Dynamic Mean Flow and Small-Scale Interaction Through Topographic Stress*, J. Nonlin. Science 9, 89–130 (1999).
- (with J.B. Keller) *Nonreflecting Boundary Conditions for Maxwell’s Equations*, J. of Comput. Phys. 139, 327–342 (1998).
- (with A.J. Majda) *Model Dynamics and Vertical Collapse in Decaying Strongly Stratified Flows*, Phys. of Fluids 9, 2932–2940 (1997).
- (with A.J. Majda) *Crude Closure Dynamics Through Large Scale Statistical Theories*, Phys. of Fluids 9, 3431–3442 (1997).
- (with T. Huckle) *Parallel Preconditioning with Sparse Approximate Inverses*, SIAM J. of Scient. Comput. 18, 838–853 (1997).
- (with J.B. Keller) *Nonreflecting Boundary Conditions for Time Dependent Scattering*, J. of Comput. Phys. 127, 52–65 (1996).
- (with J.B. Keller) *On Nonreflecting Boundary Conditions*, J. of Comput. Phys. 122, 231–243 (1995).
- (with J.B. Keller) *Exact Nonreflecting Boundary Conditions for the Time-dependent Wave Equation*, SIAM J. of Appl. Math. 55, 280–297 (1995).

REFEREED CONFERENCE PROCEEDINGS

- (with M. Mehlin and S. Sauter) *Convergence Analysis of Energy Conserving Explicit Local Time-stepping Methods for the Wave Equation*, in Proc. of 13th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2017), held at University of Minnesota, Twin Cities, May 15–19, pp. 167–168, 2017.
- (with M. Kray and U. Nahum) *Adaptive Eigenspace Method for Inverse Scattering Problems in the Frequency Domain*, in Proc. of 13th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2017), held at University of Minnesota, Twin Cities, May 15–19, pp. 163–164, 2017.
- (with J. Tang) *Local Time-stepping for the Solution of the Helmholtz Equation via Controllability Methods*, in Proc. of 13th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2017), held at University of Minnesota, Twin Cities, May 15–19, pp. 353–354, 2017.
- (with L. Gaudio and M. Mehlin) *Convergence Analysis of Leap-Frog Based Local Time-stepping for the Wave Equation*, in Proc. of 12th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2015), held at KIT, Karlsruhe, July 20–24, 2015.

- (with U. Nahum) *Adaptive Eigenspace Inversion for the Helmholtz Equation*, in Proc. of 12th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2015), held at KIT, Karlsruhe, July 20–24, 2015.
- (with M. Mehlin) *Runge-Kutta type Explicit Local Time-stepping for Electromagnetics*, in Proc. of 12th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2015), held at KIT, Karlsruhe, July 20–24, 2015.
- (with M. Almquist and M. Mehlin) *Multi-Level Runge-Kutta based Explicit Local Time-stepping for Wave Propagation*, in Proc. of 12th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2015), held at KIT, Karlsruhe, July 20–24, 2015.
- (with F. Assous, M. Kray and F. Nataf) *Wave Splitting for Time-Dependent Scattered Field Separation*, in Proc. of 12th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2015), held at KIT, Karlsruhe, July 20–24, 2015.
- (with D. Peter, M. Rietmann, O. Schenk and B. Uçar) *Load-Balanced Local Time Stepping for Large-Scale Wave Propagation*, in Proc. of 29th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2015), held in Hyderabad, India, May 25–29, pp. 925–935, 2015.
- (with A. Abdulle and C. M. Stohrer) *Finite Element Heterogeneous Multiscale Method for the Wave Equation: Long-Time Effects*, in Proc. of 11th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2013), held in Gammarth, Tunisia, June 3–7, 2013.
- (with M. Mehlin and T. Mitkova) *Runge-Kutta type Explicit Local Time-Stepping Methods*, in Proc. of 11th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2013), held in Gammarth, Tunisia, June 3–7, 2013.
- (with F. Assous, M. Kray and F. Nataf) *Time-Reversed Absorbing Conditions (TRAC): Discrimination between one and two nearby inclusions in the partial aperture case*, in Proc. of 11th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2013), held in Gammarth, Tunisia, June 3–7, 2013.
- (with L. Gaudio and O. Schenk) *Interior point method for time-dependent inverse problems*, in Proc. of 11th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2013), held in Gammarth, Tunisia, June 3–7, 2013.
- (with J. Huber and O. Schenk) *Interior Point Methods for the Inverse Medium Problem on Massively Parallel Architectures*, in Proc. of Internat. Conf. on Computational Science (ICCS 2011), held in Singapore, June 1–3, 2011, Procedia Comp. Sc. vol. 4, Elsevier, pp. 1466–1474, 2011.
- (with J. Huber, O. Schenk and A. Waechter) *Solving time-harmonic inverse medium optimization problems with inexact interior-point step computation*, in Proc. of SIAM Conference on Optimization (OPT 11), held in Darmstadt, May 16–19, 2011.
- (with T. Mitkova) *High-order explicit local time-stepping methods for transient wave motion*, in Proc. of 10th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2011), held at SFU, Vancouver, July 25–29, 2011.
- (with A. Abdulle and C. Stohrer) *Finite element heterogeneous multiscale method for transient wave propagation*, in Proc. of 10th Internat. Conf. on Math. and Numerical Aspects of Wave Propagation (WAVES 2011), held at SFU, Vancouver, July 25–29, 2011.
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