



Alfio Borzi

Professor of Mathematics

Experience

- 2011 - Now **Full Professor (Chair Mathematik IX)** [University of Würzburg, Germany](#)
Starting March 1st, 2011, till now, Full Professor (W3) and Chair of Mathematik IX 'Scientific Computing' at the Institute for Mathematics, University of Würzburg. I built up this new chair to its present status with a W2 and W1 professorships. In few years, I could make this chair internationally visible.
(In 2011, I also got a call for the full professorship 'Algorithmic Optimization' at the Humboldt Universität zu Berlin, but I declined this offer.)
- 2008 - 2011 **Associate Professor** [Università degli Studi del Sannio, Italy](#)
In the period 2008-2010, I was Associate Professor at the Università degli Studi del Sannio, in the Engineering Faculty. During this period, I contributed to the LIGO project and collaborated on the development of algorithms for image restoration applied to SAR interferograms.
- 2003 - 2007 **Associate Professor** [University of Graz, Austria](#)
In the period 2003-2007, I was Associate Professor at Institute for Mathematics and Scientific Computing, Karl-Franzens-University Graz. During this period I was leading a FWF project on quantum control problems and a SFB sub-project on non-linear reaction-diffusion (monodomain) models for medical application.
- 1998 - 2003 **Assistant Professor** [University of Graz, Austria](#)
In 1998 - 2003, I was Assistant Professor at Institute for Mathematics and Scientific Computing Karl-Franzens-University Graz. My research focused on multigrid methods and optimal control problems.
- 1996 - 1997 **Research Engineer** [AVL List GmbH, Graz, Austria.](#)
During the period 1996 - 1997, I was Research Engineer in the internationally renowned company AVL List GmbH, Graz, Austria. I worked on gas dynamics problems and on multigrid solvers and finite-volume schemes for CFD problems.
- 1993 - 1995 **Research Officer** [University of Oxford, UK](#)
In 1993 - 1995, I was Research Officer at the Oxford University Computing Laboratory (OUCL), Oxford, UK, in the group of Professor Bill Morton. I worked on special finite-volume schemes and their solution by multigrid methods.
- 1991 - 1992 **Lieutenant** [CNMCA, Roma, Italy](#)
During the period 1991 - 1992, I was an Italian Air Force Officer (Lieutenant) serving at the Centro Nazionale di Meteorologia e Climatologia, CNMCA, Roma, Italy. I worked on data analysis and numerical weather prediction.

Address

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Personal Data

(Alfio E. Borzi)
Birth: 01.03.1965,
Catania, Italy
Citizenship: Italian

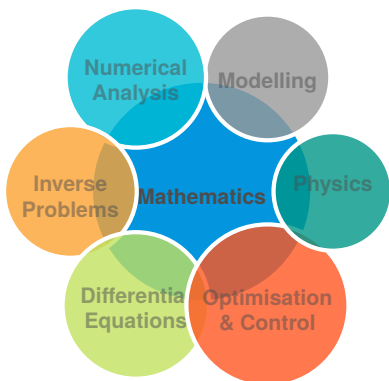
Personal Skills



Languages

Italian ★★★★★
English ★★★★★
German ★★★★★
French ★★★★★

Scientific Knowledge



Professional metrics

Scopus h-index : 20;
Google h-index : 28;
i10-index 69;
Total citations : Scopus
1456; Google 3182.

OS & Coding

GNU/Linux ★★★★★
MacOS ★★★★★
Fortran ★★★★★
MATLAB ★★★★★
Python ★★★★★
C++ ★★★★★

Places Lived

Benevento
Cambridge
Catania
Firenze
Graz
Oxford
Roma
Salzburg
Würzburg

Education

- 1998 - 2003 **Habilitation** [Karl-Franzens-University Graz](#)
Habilitation at Karl-Franzens-University Graz, Austria.
- 1991 - 1993 **Dottore di ricerca in Matematica** [SISSA/ISAS, Italy](#)
Doctor Philosophy (Ph.D.) in Mathematical Physics, SISSA/ISAS-
International School for Advanced Studies, Trieste, Italy.
- 1988 - 1990 **Magister Philosophiae (M.Ph.) in Mathematical Physics** [SISSA/ISAS, Italy](#)
1988 - 1990 Master Philosophy (M.Ph.) in Mathematics, SISSA/ISAS-
International School for Advanced Studies, Trieste, Italy.
- 1983 - 1988 **Laurea in Fisica** [Università degli Studi di Catania, Italy](#)
1983 - 1988 Laurea in Physics (MSc), University of Catania, Italy.

Additional education

- 1997 **Unternehmer Pruefung** [WIFI Graz, Austria](#)
Academy of Management, WIFI Graz (A).
- 1996 **Unix and Database Administrator** [HP and Informix, Austria and Germany](#)
Administration of UNIX systems, Hewlett-Packard, Boeblingen (D), Vienna
(A). Development and administration of databases, Informix, Ismaning (D).
- 1991 **Lieutenant** [Italian Air Force, Italy](#)
Military law, management of personnel and logistic, Italian Air Force 'Scuola
di Guerra Aerea', Firenze (I).
- 1991 **Lieutenant** [Italian Air Force, Italy](#)
Meteorology and numerical weather prediction, National Center of
Meteorology and Climatology (CNMCA), Roma (I).

Main research and teaching topics

1) Numerical solution of PDE optimization problems. 2) Development and analysis of multigrid methods. 3) Analysis of discretization schemes for partial differential equations. 4) Simulation and optimization with uncertainty. 5) Simulation and control of quantum systems. 6) Modeling and numerical solution of gas dynamics problems. 7) Modeling and simulation of bio-chemical processes. 8) Imaging analysis and inverse problems. 9) Multi-agent differential systems. 10) Stochastic models and control. 11) Fokker-Planck and continuity equations. 12) Neural networks analysis and application.

Research Work - Main Contributions

Trained in Mathematics and Physics, my main field of expertise consists in developing and connecting analytical and numerical methods in view of solving fundamental application problems that are often related to simulation, optimal control and optimization. I was among the early initiators, alone or in cooperation, of the following research

Reviewer

For Agencies:

DFG, ANVUR, The Royal Society of London, The Russian Science Foundation

For Journals:

SISC, SICON, SINUM, SIOPT, MMS, COAP, JCAM, JCOMP, JDCS, OMS, IJVC, NM:TMA, etc.

Scopus & ORCID

Scopus Author ID:
6603632708

ORCID ID:
0000-0002-8050-1336

Hobby

Oil painting
gourmet cooking
poetry

fields

1. Multigrid methods for solving PDE optimization problems
2. Modelling and numerical solution of quantum control problems
3. Fokker-Planck approach to stochastic control problems

Among my achievements, I also would like to mention the theoretical investigation of non-smooth PDE control problems, the development of proximal and Pontryagin's maximum principle (PMP) schemes for optimization problems with differential models, the modelling of leadership-based control of multi-agent systems, the development of optimisation schemes to solve imaging problems, and various theoretical and numerical analysis results with linear and nonlinear PDE models.

Present research topics include optimal control of Boltzmann models and Monte-Carlo methods, differential games for multi-agent systems, PMP-based algorithms for solving non-smooth control problems, and multilevel-multiscale neural networks for medical imaging.

Teaching

Analysis I and II, Linear Algebra I and II, Optimization I and II, Operations Research, Complex Analysis, Functional Analysis, Applied Analysis, Nonlinear Analysis, Ordinary Differential Equations, Programming in C++, Numerical Analysis I and II, Theory of Partial Differential Equations, Optimal Control Theory, Multigrid Methods, Multilevel Methods in Optimization with PDE models, Numerical Analysis of Partial Differential Equations and Optimality Systems, Modelling and Scientific Computing, Simulation and Optimal Control of Quantum and Stochastic Systems, Implementation of Neural Network Algorithms,

I have been responsible to design and deliver series of lectures on multilevel methods, optimization and control, and numerical analysis of PDEs for PhD schools in the Philippines (Diliman), The Netherlands (Woudschoten-Zeist), Italy (Catania), Austria (Graz), Spain (Zaragoza), and Germany (Schloss Thurnau and Trier).

Memberships and fellowships

- Member of GiP - Gesellschaft für Inverse Probleme e.V.
- Member of EMS and SIAM.
- Tinsley Oden Fellow, Institute for Computational Engineering and Sciences, University of Texas at Austin, USA.

Professional responsibilities

- Member of the Research Council of the Hugo Steinhaus Center, Wrocław (Breslau). http://prac.im.pwr.wroc.pl/~hugo/HSC/hsc_ang.html
- Member of the Internationalisation Committee, Universität Würzburg. Past Member of the Commission for Research and Technology Transfer of the University of Würzburg. Past member of the Research in Sciences Committee, Universität Würzburg.
- Profesor Invitado of the PHD Program in Applied Mathematics at Escuela Politécnica Nacional de Ecuador. <http://www.math.epn.edu.ec/doctorado/index.php/profesores>

Editor Duty

Associate Editor:

SIAM Journal on Scientific Computing (SISC).

SIAM Review, Books section

Numerical Mathematics: Theory, Methods and Applications (NM-TMA).

Guest Editor of CVS, NLAA and NM:TMA.

Supervision of PhD Thesis

- **T. Breitenbach**, *A sequential quadratic Hamiltonian scheme for solving optimal control problems with non-smooth cost functionals*, PhD Math. Thesis, Univ. Würzburg, 2019.
- **D. Kioi Gathungu**, *On multigrid and H-matrix methods for partial integro-differential equations*. PhD Math. Thesis, Univ. Würzburg, 2017.
- **M. Sprengel**, *A theoretical and numerical analysis of a Kohn-Sham equation and related control problems*, PhD Math. Thesis, Univ. Würzburg, 2017.
- **B. Gaviraghi**, *Theoretical and numerical analysis of Fokker-Planck optimal control problems for jump-diffusion processes*. PhD Math. Thesis, Univ. Würzburg, 2017.
- **A. Schindele**, *Proximal methods in medical image reconstruction and in nonsmooth optimal control of partial differential equations*. PhD Math. Thesis, Univ. Würzburg, 2016.
- **J. Merger**, *Optimal control and function identification in biological processes*. PhD Math. Thesis, Univ. Würzburg, 2016.
- **S. Wongkaew**, *On the control through leadership of multi-agent systems*. PhD Math. Thesis, Univ. Würzburg, 2015.
- **G. Ciaramella**, *Optimal control of quantum spin systems*. PhD Math. Thesis, Univ. Würzburg, 2015.
- **M. Mohammadi**, *Discretization of the Fokker-Planck equation and related control systems*. PhD Math. Thesis, Univ. Würzburg, 2015.
- **M. Munir Butt**, *Formulation and multigrid solution of Cauchy-Riemann optimal control problems*, PhD Math. Thesis, Univ. Graz, 2011.
- **M. Vallejos**, *Multigrid optimization methods for elliptic optimal control problems*. PhD Math. Thesis, Univ. Graz, 2008.

Ongoing:

- **Jan Bartsch**, *Optimal control of Boltzmann models with Monte-Carlo methods*, PhD Math. Thesis, ongoing.
- **Francesca Calà Campana**, *Differential Nash games*, PhD Math. Thesis, ongoing.
- **Nadja Vater**, *Multilevel multiscale convolutional neural networks*, PhD Math. Thesis, ongoing.
- **Jacob Körner**, *Modelling and control of stochastic models from behavioural epidemiology*, PhD Math. Thesis, ongoing.

Supervision of Master Thesis (selection out of 20)

- **Max Steinlein**, *The Pontryagin maximum principle for solving Liouville optimal control problems*, MSc Math. Thesis, Univ. Würzburg, 2020.
- **Jonas Kleieisel**, *Continuous models of pulse-coupled neural networks for image segmentation*, MSc Math. Thesis, Univ. Würzburg, 2020.
- **Nico Nees**, *A FEM-SQH Framework for Solving Elliptic Optimization Problems*, MSc Math. Thesis, Univ. Würzburg, 2020.
- **Andreas Seufert**, *On the SSN and SQH methods for solving non-smooth optimal control problems*, MSc Math. Thesis, Univ. Würzburg, 2020.
- **Nadja Henning (now Vater)**, *Nested iteration for approximation with neural networks*, MSc Math. Thesis, Univ. Würzburg, 2019.
- **Jan Bartsch**, *Optimal control problems governed by Liouville models - Mathematical analysis and implementation*, MSc Math. Thesis, Univ. Würzburg, 2018.
- **Melina-Loren Kienle Garrido**, *On the optimal control of a new cancer therapy model*, MSc Math. Thesis, Univ. Würzburg, 2017. (with publication in Journal)
- **Lisa Schäfer**, *A mathematical investigation of a new Lorentz-covariant heat conduction model*, MSc Math. Thesis, Univ. Würzburg, 2017.
- **Andrea Thomann**, *Stability and accuracy of a pseudospectral scheme for the Wigner function equation*, MSc Math. Thesis, Univ. Würzburg, 2015. (with publication in Journal)
- **Veronika Thalhofer**, *Formulation and investigation of a new stochastic hybrid system for subtilin production and the corresponding Fokker-Planck equation*, MSc Math. Thesis, Univ. Würzburg, 2015. (with publication in Journal)
- **Roberta Mancini**, *An adjoint-based optimization scheme for solving time-domain electromagnetic inverse scattering problems*, MSc Math. Thesis, Univ. Sannio, 2009.
- **Elisabeth Decker**, *Spectral methods for the Schrödinger equation*. MSc Math. Thesis, Univ. Graz, 2005. (with publication in Journal)

I have also supervised 10 Bachelor thesis.

Main Research Grants

- BMBF-Verbundprojekt **iDeLIVER - Intelligent MR Diagnosis of the Liver by Linking Model and Data-driven Processes** (Project Leader, 3 years; start 2020), supported by BMBF, Germany.
- BFHZ Project **Multi-agent Fokker-Planck Nash games** (Project Leader, 1 year; start 2018). Supported by BFHZ, Germany.
- BMBF-Verbundprojekt **ROENOBIO - Robust energy optimization of fermentation processes for the production of biogas and wine** (Project Leader, 4 years; start 2013), supported by BMBF, Germany.
- EU Marie-Curie **Multi-ITN STRIKE - Novel Methods in Computational Finance** (Project Leader, 3 years; start 2013). Supported by EU.
- IZKF-Project **Parallel Multigrid Imaging and Compressed Sensing for Dynamic 3D Magnetic Resonance Imaging** (Project Leader, 3 years; start 2013). Supported by IZKF Universität Würzburg, Germany.
- DFG Project **COCIQ, Controllability and Optimal Control of Interacting Quantum Dynamical Systems** (Project Leader, 3 years; start 2012). Supported by DFG, Germany.

- FWF-Project, MGINV-MOBIS, SFB Mathematical Optimization with Applications to Biomedical Sciences, **Fast Multigrid Methods for Inverse Problems** (Project Leader, 3 years; start 2008). Supported by FWF, Austria.
- FWF-Project, **Quantum optimal control of semiconductor nanostructures** (Project Leader, 3.5 years; start 2005). Supported by FWF, Austria.

Industrial Projects

- CFD Optimal shape design (with AVL List GmbH).
- PARALLEL AMG: Investigation and Development (with AVL List GmbH).
- Boundary Conditions Calculation in gas-dynamics package BOOST (with AVL List GmbH).
- The Simulation of the Gas Dynamics with Perforated Pipes in Plenum or in Pipes with BOOST (with AVL List GmbH).
- Comparison of Multigrid and SOR for the Solution of the Reynolds Equation in EXCITE (with AVL List GmbH).

Organization of Workshops/Conferences

- Organizer and Chair of the European Multigrid Conference EMG2010, Isola d'Ischia, Italy, 2010.
- European Science Foundation OPTPDE Workshop Fast solvers for simulation, inversion, and control of wave propagation problems, 26 - 28 September 2011, University of Würzburg, Germany. (ESF Grant 22.000 Eur)
- Weizmann Workshop 2013 on Multilevel Computational Methods and Optimization, The Weizmann Institute of Science, April 30 - May 02, 2013, Rehovot, Israel.
- European Science Foundation OPTPDE Workshop ESF OPTPDE Workshop InterDyn2013, 10 - 12 September 2013, Université Paris-Dauphine, Paris, France. (ESF Grant 26.000 Eur)
- Multi-ITN STRIKE and WWCS Mini-Workshop in Stochastic Computing and Optimization, Würzburg, Germany, September 30 - October 2, 2014
- 27th IFIP TC7 Conference 2015 on System Modelling and Optimization, Sophia Antipolis, France, 29.6. - 3.7.2015: Two Minisymposia: 1) Quantum optimal control; 2) Sparse reconstruction and medical imaging.
- FGS'2019 French-German-Swiss Conference on Optimization, Nice, Valrose campus, France, 17.9. - 20.9.2019: Minisymposium: Game theory approaches in Inverse Problems and Control.

Some Invited Talks

- The sequential quadratic Hamiltonian scheme solving challenging optimal control problems, October 2020, MODEMAT, Escuela Politécnica Nacional, Quito, Ecuador. (Online)
- The Liouville equation, its extensions, and related optimal control problems, October 2020, Universität Basel, Switzerland. (Online)
- On ensemble optimal control problems governed by Liouville, Fokker-Planck and linear Boltzmann equations - A workshop to celebrate the 50th anniversary of applied mathematics at the FAU Erlangen Nürnberg, March 2020, Germany.

- A sequential quadratic Hamiltonian scheme for solving optimal control problems with non-smooth cost functionals, Workshop “New trends in PDE constrained optimization”, October 2019, RICAM, Linz, Austria.
- Optimal control problems with random and stochastic models, Autumn School 2019, DFG Research Training Group 2126 - Algorithmic Optimization -, University of Trier, October 2019, Trier, Germany.
- Optimal control of the Keilson-Storer master equation, Department of Mathematics and Informatics, University of Catania, 02.09.2019, Catania, Italy.
- On differential games with bilinear structure - a general framework for modelling pedestrians' motion -, Minisymposium “Novel Concepts in Model-driven Optimization and Control of Agent-based Systems”, ICIAM 2019, 15.07-19.07.2019, Universidad de Valencia, Spain.
- Zufall und Spiele beim Spaziergehen, Kinderuni Weil der Stadt, 16.05.2019, Weil der Stadt, Germany.
- On the modelling of particle and pedestrian motion with Fokker-Planck equations, MOX Seminars Series, Department of Mathematics, Politecnico di Milano, April 2019, Milano, Italy.
- On the modelling of particle and pedestrian motion with Fokker-Planck equations, Department of Mathematics, Imperial College London, February 2019, London, UK.
- On the optimal control of a Kohn-Sham quantum model, Workshop PRACQSYS 2018: Principles and Applications of Control in Quantum Systems, Henri Poincaré Institute, July 2018, Paris, France.
- From Brownian to pedestrian motion and Fokker-Planck Nash games, Lothar-Collatz-Kolloquium für Angewandte Mathematik, Fachbereich Mathematik, Universität Hamburg, June 2018, Hamburg, Germany.
- From Brownian to pedestrian motion and Fokker-Planck Nash games, Lomonosov State University, April 2018, Moscow, Russia.
- From Brownian motion to pedestrian avoidance, Mathematisches und Mathematikdidaktisches Kolloquium, Universität Oldenburg, November 2017, Oldenburg, Germany.
- On the solution of some PDE control problems in the framework of the Pontryagin' s maximum principle, Workshop INDAM 'Numerical methods for optimal control problems: algorithms, analysis and applications', June 2017, Rome, Italy.
- On a Fokker-Planck Nash game to model pedestrian motion, Schwerpunktskolloquium, University of Konstanz, October 2017, Germany.
- Fast iterative schemes for solving PDE control problems with the Pontryagin maximum principle, Institute of Numerical Mathematics (INM) at the Steklov Institute of Mathematics, February 2017, Moscow, Russia.
- Analysis of a pseudospectral scheme for the Wigner function equation, Workshop Mathematical Models for Quantum and Classical Mechanics, SEMODAY 2016, Nov. 17-18, 2016, Florence, Italy.
- On a time-dependent Kohn-Sham equation and related optimal control problems, CECAM Workshop Numerical methods for optimal control of open quantum systems, Sept. 26-28, 2016, FU Berlin, Berlin, Germany.
- Advances in the numerical solution of quantum control problems, Workshop Quantum Cybernetics & Control 2015 (QCC2015), Jan. 19-23, 2015, Nottingham, UK.
- A Fokker-Planck strategy to control stochastic processes, Marian Smoluchowski Symposium on Statistical Physics, Sept. 22-26, 2014, Zakopane, Poland.

- A Fokker-Planck Strategy to Control Stochastic Processes, Kolloquium, 2014 April, Johann Radon Institute for Computational and Applied Mathematics (RICAM), Austrian Academy of Sciences, Linz, Austria.
- Fast and accurate computational methods for quantum control problems, 536th W.E. Heraeus Seminar on Optimal Control of Quantum Systems June 16th to 19th 2013, Physikzentrum Bad Honnef, Germany.
- A Fokker-Planck-Kolmogorov control framework for stochastic processes, Workshop Numerical Methods for Uncertainty Quantification, May 13-17, 2013, Hausdorff Center for Mathematics, Bonn, Germany.
- An Optimal Control Strategy for Probability Density Functions of Stochastic Processes and Piecewise Deterministic Processes, Mathematisches Kolloquium, Univ. Bayreuth, Jan. 2013, Germany.

Newspapers, TV, Youtube Videos

Newspapers

- Süddeutsche Zeitung, Section 'Panorama', 11. Oktober 2017, Nr. 234: **Alfio Borzi, der ein mathematisches Modell gegen Zusammenstöße entwickelt hat**; see also <http://www.sueddeutsche.de/panorama/ein-anruf-bei-alfio-borz-1.3702529>
- Main Post, Section 'Wissen', 7. Oktober 2017, Nr. 231: **Formeln für Fußgänger**; see also <http://www.mainpost.de/regional/wuerzburg/Mathematiker-Mathematische-Modell-art735,9761234>
- einBlick, das Online-Magazin der Universität Würzburg: 1) 22. September 2017: **Mit der Spieltheorie auf Kollisionskurs**; see also <http://www.presse.uni-wuerzburg.de/aktuell/einblick/single/news/mit-der-spieltheorie-auf-kollisionskurs-1/>; 2) 16. Juli 2013: **Die Formel für mehr Aroma und Ertrag**; see also https://opus.bibliothek.uni-wuerzburg.de/opus4-wuerzburg/frontdoor/deliver/index/docId/6736/file/einBlick_201328.pdf; 3) 9. Juli 2013: **Workshop für einen Pionier**; see also <http://www.presse.uni-wuerzburg.de/aktuell/einblick/single/news/workshop-f->; 4) 30. Oktober 2012: **Mathematik gegen die Krise**; see also <http://www.presse.uni-wuerzburg.de/fileadmin/uniwue/Presse/EinBLICK/Archiv/2012/ar201239.pdf>; 5) 8. Februar 2011: **Die dritte Säule des Erkenntniserwerbs**; see also <http://www.presse.uni-wuerzburg.de/fileadmin/uniwue/Presse/EinBLICK/Archiv/2011/ar201105.pdf>

Television & radio

- Bayerische Rundfunk Fernsehen, Frankenschau aktuell Das Wichtigste aus Franken, 14. März 2018: **Pi-Tag**; see also <https://www.br.de/mediathek/video/frankenschau-aktuell-5a71a5a08e1343001858eb4c> and <https://youtu.be/6B6R9SUPgIA>
- SWR1 'Leute', 12.07.2018. <https://www.swr.de/swr1/bw/programm/leute/borzi-prof/-/id=1895042/did=21937368/nid=1895042/o1p3rc/index.html>

Youtube Videos

- **Alfio's Math** : https://www.youtube.com/watch?v=ju6rG_7Z_5I
- **Quantenmechanik - Von Democritus bis Schrödinger** : https://www.youtube.com/watch?v=BTiPcnT_QKc
- **Quantenkontrolle - Die Zukunft der Wissenschaft!** : <https://www.youtube.com/watch?v=00KMy90zXuM>

- **Malthus & Verhulst, die Bevölkerungsentwicklung und die Weingärung** : <https://www.youtube.com/watch?v=NtLnp1cUPmc>
- **Einstein & Co. und die Revolution des Aktienhandels** : <https://www.youtube.com/watch?v=Qb4obyF7c9I>
- **On the optimal control of a Kohn-Sham quantum model - Workshop PRACQSYS 2018 at IHP Paris** : <https://www.youtube.com/watch?v=6chQr02uInY&index=53&list=PL9kd4mpdvWcAMYt4Fhw0dgBPF24bQmDGz>

Alfio Borzi 's Publications

Books

- A. Borzi, **Modelling with Ordinary Differential Equations: A Comprehensive Approach**, CRC/Chapman and Hall, 2020 (ISBN 9780815392613).
- A. Borzi, G. Ciaramella and M. Sprengel, **Formulation and Numerical Solution of Quantum Control Problems**, SIAM, Philadelphia, 2017 (ISBN 978-1-611974-83-6).
- A. Borzi and V. Schulz, **Computational Optimization of Systems Governed by Partial Differential Equations**, SIAM, Philadelphia, 2012 (ISBN 978-1-611972-04-7).
- A. Borzi and M. Wogrin, **Equazioni Differenziali Ordinarie**, Hevelius Edizioni, Benevento, 2009 (ISBN 978-88-86977-63-0).
- A. Borzi, **In den Brunnen gefallen beim Sterne schauen - Eine sehr kurze Geschichte der Mathematik -**, epubli, Berlin, 2017 (ISBN 978-3-7450-3862-0). (Also in Russian.)

Ten Selected Publications

- M. Annunziato and A. Borzi, **A Fokker-Planck control framework for multidimensional stochastic processes**, Journal of Computational and Applied Mathematics, 237 (2013), 487-507.
- A. Borzi, **Multigrid methods for parabolic distributed optimal control problems**, Journal of Computational and Applied Mathematics, 157 (2003), 365-382.
- A. Borzi and G. Borzi, **Algebraic multigrid methods for solving generalized eigenvalue problems**, International Journal for Numerical Methods in Engineering, 65(8) (2006), 1186-1196.
- T. Breitenbach, A. Borzi, **The Pontryagin maximum principle for solving Fokker-Planck optimal control problems**, Computational Optimization and Applied Mathematics (2020). <https://doi.org/10.1007/s10589-020-00187-x>
- A. Borzi, G. Stadler, and U. Hohenester, **Optimal quantum control in nanostructures: Theory and application to a generic three-level system**, Phys. Rev. A 66, 053811 (2002).
- J. Bartsch, A. Borzi, F. Fanelli, S. Roy, **A theoretical investigation of Brockett's ensemble optimal control problems**, Calculus of Variations and Partial Differential Equations, 2019, pp.1-34. <https://doi.org/10.1007/s00526-019-1604-2>
- A. Borzi and G. von Winckel, **Multigrid methods and sparse-grid collocation techniques for parabolic optimal control problems with random coefficients**, SIAM J. Sci. Comp., 31 (2009), 2172-2192.
- S. Roy and A. Borzi, **A new optimisation approach to sparse reconstruction of log-conductivity in acousto-electric tomography**, SIAM Journal on Imaging Sciences, 11 (2018), 1759-1784.
- S. Roy, A. Borzi, and A. Habbal, **Pedestrian motion modelled by Fokker - Planck Nash games**, Royal Society open science, 4: 170648, 2017.
- S. Wongkaew and A. Borzi, **Modeling and control through leadership of a refined flocking system**, Mathematical Models and Methods in Applied Sciences (M3AS), 25 (2015), 255-282.

Special Issues

- A. Borzì, J. Brannick, F. Gaspar and I. Yavneh, Special Issue - Weizmann Workshop 2013, Numerical Mathematics: Theory, Methods and Applications, 8 (2015).
- A. Borzì and C. W. Oosterlee, Special Issue - OPTPDE 2011, ESF OPTPDE Workshop, 2011, Numerical Linear Algebra with Applications, 20 (2013), 539-711
- A. Borzì and C. W. Oosterlee, Special Issue in Numerical Mathematics: Theory, Methods and Applications (NM-TMA), European Multigrid Conference, EMG 2010, Numerical Mathematics: Theory, Methods and Applications, 5 (2012).
- A. Borzì and C. W. Oosterlee, Special Issue in Computing and Visualization in Science (CVS), European Multigrid Conference, EMG 2010, Computing and Visualization in Science, 14 (2011).

Algorithms

- **COKOSNUT**: a code for the control of the time-dependent Kohn-Sham model (2017); in Computer Physics Communications, CPC Program Library.
- **LONE**: a code for the sparse control of quantum systems (2016); in Computer Physics Communications, CPC Program Library.
- **SKRYN**: a fast semismooth-Krylov-Newton method for controlling Ising spin systems (2015); in Computer Physics Communications, CPC Program Library.
- **QUCON**: A fast Krylov-Newton code for dipole quantum control problems (2010); in Computer Physics Communications, CPC Program Library.
- **CNMS**: a cascadic monotonic time-discretized algorithm for finite-level quantum control computation (2008); in Computer Physics Communications, CPC Program Library.
- **SANTAFE**: a space-time multigrid method for open-loop (and receding-horizon) optimal control of time-dependent reaction-diffusion systems (2005). In MGNet Home Page, <http://www.mgnet.org>.
- **CONTROLLA**: a full multigrid method for the solution of an optimality system arising from a singular optimal control problem (2001). In MGNet Home Page, <http://www.mgnet.org>.
- **INTEGRA**: a multigrid code for the solution of systems of nonlinear integral equations (1998). In MGNet Home Page, <http://www.mgnet.org>.
- **TBA**: a multigrid code for the solution of the thermodynamic Bethe Ansatz equations (1993); in Computer Physics Communications, CPC Program Library.

Alfio Borzi 's Publications in Journals

121. A. Borzi, The Fokker-Planck framework in the modeling of pedestrians' motion, Chapter 6 in: L. Gibelli (ed.), *Crowd Dynamics, Volume 2, Modeling and Simulation in Science, Engineering and Technology*, Birkhäuser, Cham, Switzerland, 2020.
https://doi.org/10.1007/978-3-030-50450-2_6
120. T. Breitenbach, A. Borzi, The Pontryagin maximum principle for solving Fokker-Planck optimal control problems, *Computational Optimization and Applied Mathematics*, 76 (2020), 499-533.
<https://doi.org/10.1007/s10589-020-00187-x>
119. F. Calà Campana, G. Ciaramella, A. Borzi, Nash equilibria and bargaining solutions of differential bilinear games, *Dynamic Games and Applications* (2020).
<https://doi.org/10.1007/s13235-020-00351-2>
118. T. Breitenbach, A. Borzi, A sequential quadratic Hamiltonian scheme for solving non-smooth quantum control problems with sparsity, *Journal of Computational and Applied Mathematics*, 369 (2020), p. 112583.
<https://doi.org/10.1016/j.cam.2019.112583>
117. J. Bartsch, A. Borzi, F. Fanelli, S. Roy, A theoretical investigation of Brockett's ensemble optimal control problems, *Calculus of Variations and Partial Differential Equations*, 58 (2019).
<https://doi.org/10.1007/s00526-019-1604-2>
116. T. Breitenbach, A. Borzi, On the SQH scheme to solve non-smooth PDE optimal control problems, *Numerical Functional Analysis and Optimization*, 40 (2019), 1489-1531.
<https://doi.org/10.1080/01630563.2019.1599911>
115. T. Breitenbach and A. Borzi, A sequential quadratic Hamiltonian method for solving parabolic optimal control problems with discontinuous cost functionals, *Journal of Dynamical and Control Systems*, 25 (2019), 403-435.
114. M.-L. Kienle Garrido, T. Breitenbach, K. Chudej, and A. Borzi, Modeling and Numerical Solution of a Cancer Therapy Optimal Control Problem, *Applied Mathematics*, 9 (2018), 985-1004.
113. S. Roy and A. Borzi, A new optimisation approach to sparse reconstruction of log-conductivity in acousto-electric tomography, *SIAM Journal on Imaging Sciences*, 11 (2018), 1759-1784.
112. M. Annunziato and A. Borzi, A Fokker-Planck control framework for stochastic systems, *EMS Surveys in Mathematical Sciences*, 5 (2018), 65-98.
<https://doi.org/10.4171/EMSS/27>
111. M. Sprengel, G. Ciaramella and A. Borzi, Investigation of optimal control problems governed by a time-dependent Kohn-Sham model, *Journal of Dynamical and Control Systems*, 2018. <https://link.springer.com/article/10.1007/s10883-017-9393-4>
110. D.K. Gathungu and A. Borzi, A multigrid scheme for solving convection-diffusion-integral optimal control problems, *Computing and Visualization in Science*, 2017. <https://link.springer.com/article/10.1007/s00791-017-0285-7>
109. K. Kułakowski, P. Gronek, and A. Borzi, Paradox of integration - mean field approach, *International Journal of Modern Physics C*, 28 (2017), 1750133.
108. S. Roy, A. Borzi, and A. Habbal, Pedestrian motion modelled by Fokker - Planck Nash games, *Royal Society open science*, 4: 170648, 2017.

107. S. Roy, A. Annunziato, A. Borzì, and C. Klingenberg, A Fokker-Planck approach to control collective motion, *Computational Optimization and Applications*, 69 (2018), 423-459.
106. T. Breitenbach, M. Annunziato and A. Borzì, On the optimal control of a random walk with jumps and barriers, *Methodology and Computing in Applied Probability*, 20 (2018), 435-462.
105. B. Gaviraghi, M. Annunziato, and A. Borzì,
Chapter 22: Splitting Methods for Fokker-Planck Equations Related to Jump-Diffusion Processes, pp. 409-422;
Chapter 23: A Fokker-Planck Based Approach to Control Jump Processes, pp. 423-439.
Novel Methods in Computational Finance, Springer, 2017. Edited by Matthias Ehrhardt, Michael Guenther, E. Jan W. ter Maten.
104. D.K. Gathungu and A. Borzì, Multigrid Solution of an Elliptic Fredholm Partial Integro-Differential Equation with a Hilbert-Schmidt Integral Operator, *Applied Mathematics*, 8 (2017), 967-986.
103. G. Ciaramella, M. Sprengel and A. Borzì, A theoretical investigation of time-dependent Kohn–Sham equations: new proofs, *Applicable Analysis*, 2019. <https://doi.org/10.1080/00036811.2019.1679792>
102. M. Sprengel, G. Ciaramella, and A. Borzì, A theoretical investigation of time-dependent Kohn-Sham equations, *SIAM Journal on Mathematical Analysis*, 49 (2017), 1681-1704.
Erratum: *SIAM J. Math. Anal.*, 52 (2020), 1006-1008.
101. S. Roy and A. Borzì, Numerical Investigation of a Class of Liouville Control Problems, *Journal of Scientific Computing*, 73 (2017), 178-202.
100. M. Sprengel, G. Ciaramella and A. Borzì, A COKOSNUT code for the control of the time-dependent Kohn-Sham model, *Computer Physics Communications*, 214 (2017), 231-238.
99. T. Breitenbach, M. Annunziato and A. Borzì, On the optimal control of random walks, *IFAC-PapersOnLine*, 49 (2016), 248-253.
98. A. Schindele and A. Borzì, Proximal schemes for parabolic optimal control problems with sparsity promoting cost functionals, *International Journal of Control*, 90 (2016), 2349-2367.
97. B. Gaviraghi, M. Annunziato, A. Borzì, Analysis of splitting methods for solving a partial-integro differential Fokker-Planck equation, *Applied Mathematics and Computation*, 294 (2016), 1-17.
96. B. Gaviraghi, A. Schindele, M. Annunziato, A. Borzì, On optimal sparse-control problems governed by jump-diffusion processes, *Applied Mathematics*, 7 (2016), 1978-2004.
95. A. Schindele and A. Borzì, Proximal Methods for Elliptic Optimal Control Problems with Sparsity Cost Functional, *Applied Mathematics*, 7 (2016), 967-992.
94. J. Merger and A. Borzì, A Lie Algebraic and Numerical Investigation of the Black-Scholes Equation with Heston Volatility Model, *J Generalized Lie Theory Appl* (2016).
93. A. Borzì and M. Caponigro, Comment: A control theoretical approach to crowd management: Comment on 'Human behaviours in evacuation crowd dynamics: From modelling to big data toward crisis management' by Nicola Bellomo et al., *Physics of Life Reviews*, 18 (2016), 27-28.

92. V. Ratz, T. Wech, A. Schindele, A. Dierks, A. Sauer, J. Reibetanz, A. Borzi, T. Bley, H. Koestler, Dynamic 3D MR-Defecography, *Fortschr. Roentgenstr*, 188(09)(2016), 859-863.
91. S. Roy, M. Annunziato, and A. Borzi, A Fokker–Planck feedback control-constrained approach for modelling crowd motion, *Journal of Computational and Theoretical Transport*, 45 (2016), 442-458.
90. A. Thomann and A. Borzi, Stability and accuracy of a pseudospectral scheme for the Wigner function equation, *Numerical Methods for Partial Differential Equations*, 33 (2017), 62-87.
89. G. Ciaramella and A. Borzi, Quantum Optimal Control Problems with a Sparsity Cost Functional, *Numerical Functional Analysis and Optimization*, 37 (2016), 938-965.
88. J. Merger and A. Borzi, Dynamics identification in evolution models using radial basis functions, *Journal of Dynamical and Control Systems*, 23 (2017), 317-335.
87. J. Merger, A. Borzi, and R. Herzog, Optimal Control of a System of Reaction-Diffusion Equations Modeling the Wine Fermentation Process, *Optimal Control, Applications and Methods*, 38 (2017), 112-132.
86. V. Thalhafer, M. Annunziato, and A. Borzi, Stochastic modelling and control of antibiotic subtilin production, *Journal of Mathematical Biology*, 73 (2016), 727-749.
85. M. Mohammadi and A. Borzi, Hermite approximation of a hyperbolic Fokker-Planck optimality system to control a piecewise-deterministic process, *International Journal of Control*, 89 (2016), 1382-1395.
84. G. Ciaramella and A. Borzi, A LONE code for the sparse control of quantum systems, *Computer Physics Communications*, 200 (2016), 312-323.
83. T. Wech, N. Seiberlich, A. Schindele, V. Grau, L. Diffley, M. L. Gyngell, A. Borzi, H. Koestler, and J. E. Schneider, Development of Real-time Magnetic Resonance Imaging of Mouse Hearts at 9.4 Tesla – Simulations and First Application, *IEEE TRANSACTIONS ON MEDICAL IMAGING*, 35(3):912-20.
82. S. Wongkaew, M. Caponigro, K. Kułakowski, A. Borzi, On the control of the Heider balance model, *European Physical Journal - Special Topics*, 224(2015), 3325-3342.
81. A. Borzi, E.-J. Park, M. Vallejos Lass, Multigrid Optimization Methods for the Optimal Control of Convection – Diffusion Problems with Bilinear Control, *Journal of Optimization Theory and Applications*, 168 (2016), 510-533.
80. M. Annunziato, A. Borzi, M. Magdziarz, A. Weron, A fractional Fokker-Planck control framework for subdiffusion processes, *Optimal Control, Applications and Methods*, 37 (2016), 290-304
79. G. Ciaramella and A. Borzi, SKRYN: A fast semismooth-Krylov-Newton method for controlling Ising spin systems, *Computer Physics Communications*, 190 (2015), 213-223.
78. G. Ciaramella, A. Borzi, G. Dirr, D. Wachsmuth, Newton methods for the optimal control of closed quantum spin systems, *SIAM Journal on Scientific Computing*, 37 (2015), A319-A346.
77. G. Ciaramella, J. Salomon, A. Borzi, A method for solving exact-controllability problems governed by closed quantum spin systems, *International Journal of Control (IJC)*, 88 (2015), 682-702.
76. M. Mohammadi and A. Borzi, A Hermite spectral method for a Fokker-Planck optimal control problem in an unbounded domain, *International Journal for Uncertainty Quantification (IJUQ)*, 5 (2015), 233-254.

75. M. Tanvir Rahman and A. Borzi, A FEM-multigrid scheme for elliptic Nash-equilibrium multiobjective optimal control problems, *Numerical Mathematics: Theory, Methods and Applications (NMTMA)*, 8 (2015) 253-282.
74. S. Wongkaew, M. Caponigro, A. Borzi, On the control through leadership of the Hegselmann-Krause opinion formation model, *Mathematical Models and Methods in Applied Sciences (M3AS)*, 25 (2015), 565-585.
73. S. Wongkaew and A. Borzi, Modeling and control through leadership of a refined flocking system, *Mathematical Models and Methods in Applied Sciences (M3AS)*, 25 (2015), 255-282.
72. M. Annunziato, A. Borzi, F. Nobile, and R. Tempone, On the connection between the Hamilton-Jacobi-Bellman and the Fokker-Planck control frameworks, *Applied Mathematics*, 5 (2014), 2476-2484.
71. S. Gonzalez Andrade and A. Borzi, Second-order approximation and fast multigrid solution of parabolic bilinear optimization problems, *Advances in Computational Mathematics*, 41 (2015), 457-488
70. M. Mohammadi and A. Borzi, Analysis of the Chang-Cooper Discretization Scheme for a Class of Fokker-Planck Equations, *Journal of Numerical Mathematics*, 23 (2015), 271-288.
69. A. Borzi, D. di Serafino, and V. De Simone, Parallel algebraic multilevel Schwarz preconditioners for a class of elliptic PDE systems, *Computing and Visualization in Science*, 16 (2013), 1-14.
68. M. Annunziato and A. Borzi, Optimal control of a class of piecewise deterministic processes , *European Journal of Applied Mathematics*, 25 (2014), 1-25.
67. P.F. Antonietti, A. Borzi, and M. Verani, Multigrid shape optimization governed by elliptic PDEs, *SIAM J. Control Optim.*, 51 (2013), 1417-1440.
66. A. Borzi, Quantum optimal control using the adjoint method, *Nanoscale Systems: Mathematical Modeling, Theory and Applications*, 1 (2012), 93-111.
65. D. Calebiro, F. Rieken, J. Wagner, T. Sungkaworn, U. Zabel, A. Borzi, E. Cocucci, A. Zuern, M. J. Lohse, Single-molecule analysis of fluorescently labeled GPCRs reveals receptor-specific complexes with distinct dynamics and organization, *Proceedings of the National Academy of Sciences (PNAS)*, 110 (2013), 743-748.
64. M. Annunziato and A. Borzi, Fokker-Planck-based control of a two-level open quantum system, *Mathematical Models and Methods in Applied Sciences (M3AS)*, 23 (2013), 2039-2064
63. A. Borzi and C. Kanzow, Formulation and numerical solution of Nash equilibrium multiobjective elliptic control problems, *SIAM J. Control Optim.*, 51(2013), 718-744.
62. M. Annunziato and A. Borzi, A Fokker-Planck control framework for multidimensional stochastic processes, *Journal of Computational and Applied Mathematics*, 237 (2013), 487-507.
61. A. Borzi and M. Borzi, A MPC Scheme with Guaranteed Stability for the Control of Bloch Systems, *Proceedings MATHMOD 2012*, I. Troch, F. Breitenecker, eds.
60. M. M. Butt and A. Borzi, A full multigrid solution of control-constrained Cauchy-Riemann optimal control problems , *Journal of Numerical Mathematics*, 19 (2011), 189-214.
59. A. Borzi and G. von Winckel, A POD framework to determine robust controls in PDE optimization, *Computing and Visualization in Science*, 14 (2011), 91-103.
58. M. M. Butt and A. Borzi, Formulation and multigrid solution of Cauchy-Riemann optimal control problems, *Computing and Visualization in Science*, 14 (2011), 79-90.

57. S. Gonzalez Andrade and A. Borzi, Multigrid solution of a Lavrentiev-regularized state-constrained parabolic control problem, *Numerical Mathematics: Theory, Methods and Applications*, 5 (2012), 1-18.
56. M. Annunziato and A. Borzi, Optimal control of probability density functions of stochastic processes, *Mathematical Modelling and Analysis*, 15 (2010), 393-407.
55. S. Gonzalez Andrade and A. Borzi, Multigrid second-order accurate solution of parabolic control-constrained problems, *Computational Optimization and Applications*, 51 (2012), 835-866.
54. G. von Winckel and A. Borzi, QUCON: A fast Krylov-Newton code for dipole quantum control problems, *Computer Physics Communications*, 181 (2010), 2158-2163.
53. A. Borzi, V. Schulz, C. Schillings, and G. von Winckel, On the treatment of distributed uncertainties in PDE constrained optimization, *GAMM Mitteilungen*, 33 (2010), 230-246.
52. A. Borzi, Multigrid and sparse-grid schemes for elliptic control problems with random coefficients, *Computing and Visualization in Science*, 13 (2010), 153-160.
51. M. Annunziato and A. Borzi, Fast solvers of Fredholm optimal control problems, *Numerical Mathematics: Theory, Methods and Applications*, 3 (2010), 431-448.
50. A. Borzi, M. di Bisceglie, C. Galdi, G. Giangregorio, Robust registration of satellite images with local distortions, *Proceedings IEEE International Geoscience & Remote Sensing Symposium July 12-17, 2009, Cape Town, South Africa*
49. G. von Winckel, A. Borzi, and S. Volkwein, A globalized Newton method for the accurate solution of a dipole quantum control problem, *SIAM J. Sci. Comp.*, 31 (2009), 4176-4203.
48. A. Borzi and G. von Winckel, Multigrid methods and sparse-grid collocation techniques for parabolic optimal control problems with random coefficients, *SIAM J. Sci. Comp.*, 31 (2009), 2172-2192.
47. A. Borzi and V. Schulz, Multigrid methods for PDE optimization, *SIAM Review*, 51 (2009), 361-395.
46. O. Lass, M. Vallejos, A. Borzi, and C.C. Douglas, Implementation and analysis of multigrid schemes with finite elements for elliptic optimal control problems, *Computing*, 84 (2009), 27-48
45. M. Vallejos and A. Borzi, Multigrid optimization methods for linear and bilinear elliptic optimal control problems, *Computing*, 82 (2008), 31-52
44. M. Vallejos and A. Borzi, Multigrid methods for linear elliptic optimal control problems, *Numerical Mathematics and Advanced Applications*, Springer (2008)
43. G. von Winckel and A. Borzi, Computational techniques for a quantum control problem with H1-cost, *Inverse Problems*, 24 (2008) 034007.
42. A. Borzi and U. Hohenester, Multigrid optimization schemes for solving Bose–Einstein condensates control problems, *SIAM J. Sci. Comp.*, 30 (2008), 441-462.
41. P. Ditz and A. Borzi, A cascadic monotonic time-discretized algorithm for finite-level quantum control computation, *Computer Physics Communications*, 178 (2008), 393-399.
40. A. Borzi, J. Salomon, and S. Volkwein, Formulation and numerical solution of finite-level quantum optimal control problems, *Journal of Computational and Applied Mathematics*, 216 (2008), 170-197

39. U. Hohenester, P.K. Rekdal, A. Borzi, J. Schmiedmayer, Optimal quantum control of Bose-Einstein condensates in magnetic microtraps, *Phys. Rev. A* 75, 023602 (2007)
38. A. Borzi, Smoothers for control- and state-constrained optimal control problems, *Computing and Visualization in Science*, 11 (2008), 59-66.
37. A. Borzi, On the convergence of the MG/OPT method, *PAMM*, 5(1) (2005), 735-736
36. A. Borzi, High-order discretization and multigrid solution of elliptic nonlinear constrained optimal control problems, *Journal of Computational and Applied Mathematics*, 200 (2007), 67-85.
35. A. Borzi and R. Griesse, Distributed optimal control of lambda-omega systems, *Journal of Numerical Mathematics*, 14 (2006), 17-40.
34. A. Borzi, Space-time multigrid methods for solving unsteady optimal control problems, (Chapter 5) in L.T. Biegler, O. Ghattas, M. Heinkenschloss, D. Keyes and B. van Bloemen Waanders (Eds.), *Real-Time PDE-Constrained Optimization*, Computational Science and Engineering, Vol. 3, SIAM, Philadelphia, 2007.
33. A. Borzi and G. Borzi, Algebraic multigrid methods for solving generalized eigenvalue problems, *International Journal for Numerical Methods in Engineering*, 65(8) (2006), 1186-1196.
32. A. Borzi and E. Decker, Analysis of a leap-frog pseudospectral scheme for the Schroedinger equation, *Journal of Computational and Applied Mathematics*, 193(1) (2006), 65-88.
31. A. Borzi and K. Kunisch, A globalization strategy for the multigrid solution of elliptic optimal control problems, *Optimization Methods and Software*, 21(3) (2006), 445-459
30. A. Borzi, H. Grossauer, and O. Scherzer, Analysis of Iterative Methods for Solving a Ginzburg-Landau Equation, *Int. Journal of Computer Vision*, 64 (2005), 203-219.
29. A. Borzi and R. Griesse, Experiences with a space-time multigrid method for the optimal control of a chemical turbulence model, *Int. J. Numer. Meth. Fluids.*, 47 (2005), 879-885.
28. A. Borzi, Solution of lambda-omega systems: Theta-schemes and multigrid methods, *Numerische Mathematik*, 98(4) (2004), 581-606.
27. A. Borzi and K. Kunisch, A multigrid scheme for elliptic constrained optimal control problems, *Computational Optimization and Applications*, 31 (2005), 309-333.
26. A. Borzi and G. Borzi, An efficient algebraic multigrid method for solving optimality systems, *Computing and Visualization in Science*, 7(3/4) (2004), 183-188.
25. A. Borzi and G. Borzi, An algebraic multigrid method for a class of elliptic differential systems, *SIAM J. Sci. Comp.*, 25(1) (2003), 302-323.
24. A. Borzi, Multigrid methods for parabolic distributed optimal control problems, *J. Comp. Appl. Math*, 157 (2003), 365-382.
23. P. Bartsch and A. Borzi, On the Modeling and Simulation of Boundary Flow Through Partially Open Pipe Ends, *ZAMP*, 55 (2004), 946-961.
22. A. Borzi, G. Stadler, and U. Hohenester, Optimal quantum control in nanostructures: Theory and application to a generic three-level system , *Phys. Rev. A* 66, 053811 (2002).
21. A. Borzi, Fast multigrid methods for parabolic optimal control problems, *Proceedings of 18-th GAMM Seminar Leipzig 2002*.
20. A. Borzi and G. Propst, Numerical Investigation of the Liebau Phenomenon, *ZAMP*, 54 (2003), 1050 - 1072.

19. G. Propst and A. Borzi, Numerical Investigation of periodically excited valveless pumping, in *Simplicity behind Complexity*, W. Klonowski (Ed.), Proceedings of Euroattractor 2002, Warsaw, Pabst science publishers, pp. 192-200.
18. A. Borzi, K. Kunisch, and Do Y. Kwak, Accuracy and Convergence Properties of the Finite Difference Multigrid Solution of an Optimal Control Optimality System, *SIAM J. Control Opt.*, 41(5) (2003), 1477-1497.
17. A. Borzi, K. Ito, and K. Kunisch, Optimal Control Formulation for Determining Optical Flow, *SIAM J. Sci. Comput.*, 24(3) (2002), 818-847.
16. A. Borzi, K. Ito, and K. Kunisch, An Optimal Control Approach to Optical Flow Computation, *Int. J. Numer. Meth. Fluids.*, 40 (2002), 231-240.
15. A. Borzi and K. Kunisch, The Numerical Solution of the Steady State Solid Fuel Ignition Model and Its Optimal Control, *SIAM J. Sci. Comp.*, 22(1) (2000), 263-284.
14. A. Borzi, K.W. Morton, E. Suli and M. Vanmaele, Multilevel Solution of Cell Vertex Cauchy-Riemann Equations, *SIAM J. Sci. Comp.*, 18(2) (1997), 441-459.
13. M. Vanmaele, K.W. Morton, E. Suli and A. Borzi, Analysis of the Cell Vertex Finite Volume Method for the Cauchy-Riemann Equations, *SIAM J. Num. Anal.*, 34(5) (1997), 2043-2062.
12. A. Borzi and A. Koubek, A multi-grid method for the resolution of thermodynamic Bethe ansatz equations, *Comp. Phys. Commun.*, 75 (1993), 118-126.
11. A. Borzi and G. Fonte, On Variational principles for Nonlinear Partial Differential Equations in Complex Spaces, *Nuovo Cimento*, B107 (1992), 189-201.
10. A. Borzi, K. Ito and K. Kunisch An Optimal Control Approach to Optical Flow Computation, In M J Baines, editor, *Numerical Methods for Fluid Dynamics VII*, ICFD, Oxford University Computing Laboratory, 2001.
9. P. Bartsch, B. Bachner, A. Borzi, and H.A. Schuemie, Simulation of a Concentric-Tube Resonator, in *International Symposium on Experimental and Computational Aerothermodynamics of Internal Flows 5th ISAIF*, 4 - 7 September 2001 Gdansk.
8. A. Borzi and K. Kunisch, A Multigrid Method for the Optimal Control of Time-Dependent Reaction Diffusion Processes, in K.H. Hoffmann, R. Hoppe, and V. Schulz (Eds.), „Fast solution of discretized optimization problems“, *International Series on Numerical Mathematics*, Vol. 138, Birkhäuser, 2001.
7. A. Borzi and G. Borzi, Algebraic Multigrid and Conjugate Gradient Methods for the Solution of FEM Equations for 3D Static Problems, 9th IGTE Symposium on Numerical Field Calculation in Electrical Engineering, Graz (Austria), 11-14 settembre, 2000.
6. P. Bartsch and A. Borzi, A New Reconstruction Technique for the Euler Equations of Gas Dynamics with Source Terms, in E. Toro (Ed.), „Godunov Methods: Theory and Applications“, Kluwer Academic/Plenum Publishers, 2001.
5. A. Borzi, K. Kunisch, and M. Vanmaele, A Multi-Grid Approach to the Optimal Control of Solid Fuel Ignition Problems, in E. Dick, K. Riemsdagh and J. Vierendeels (Eds.), *Lecture Notes in Computer Science and Engineering*, 14, European Multigrid Meeting 1999, Springer 2000.
4. A. Borzi, K.W. Morton, E. Suli and M. Vanmaele, A full multi-grid method for the solution of the cell vertex Cauchy-Riemann equations, in “Seventh Copper Mountain Conference on Multigrid Methods”, ed. by N.D. Melson, T.A. Manteuffel, S.F. McCormick and C.C. Douglas, 73-86, NASA, Hampton, (1996).
3. A. Borzi, Burgers Equation and Multi-Grid Techniques, in “Contributions to Multigrid” ed. by P.W. Hemker and P. Wesseling, CWI, Amsterdam, (1994).

2. A. Borzi, On the Extension of the Twolevel Method for Operator Equations in Hilbert Space, in "Contributions to Multigrid" ed. by P.W. Hemker and P. Wesseling, CWI, Amsterdam, (1994).
1. A. Borzi and A. Koubek, On a multi-grid algorithm for the TBA equations, in "Multigrid Methods IV", ed. by P.W. Hemker and P. Wesseling, Birkhaeuser Verlag, Basel, (1994).