AlfioBorzì

Professor of Mathematics

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www9.mathematik.uni-wuerzburg.de

Personal Data

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

Personal Skills

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 have built up this new chair to its present status including W2 and W1 professorships and, in few years, I could make this chair internationally visible to different scientific communities.
(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 School. During this period, I contributed to the LIGO project and collaborated on the development of algorithms for image restoration applied to SAR interferograms.

2003 - 2008 **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 CFD and gas dynamics problems, multigrid solvers and finite-volume schemes.

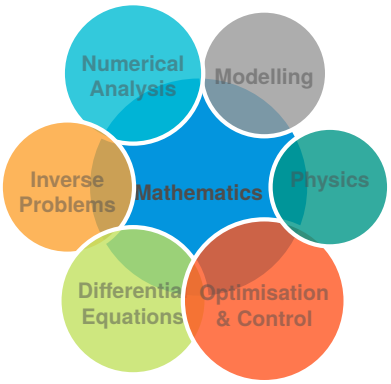
1993 - 1995 **Research Officer** University of Oxford, UK
In 1993 - 1995, I was Research Officer at the Oxford University Computing Laboratory (OUCL), Oxford, UK, in the group of Professor Bill Morton. I worked on the analysis of finite-volume schemes and their solution by multigrid methods.

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, Kalman filters, and numerical weather prediction.

Languages

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

Scientific Knowledge



Professional metrics

Scopus h-index : 20;
Google h-index : 29;
i10-index 74;
Total citations : Scopus 1618; Google 3424.

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 **Entrepreneur Qualification** — 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 related control problems. 11) Fokker-Planck and other continuity equations. 12) Neural networks analysis and application. 13) Analysis and numerical solution of differential games.

Research Work - Main Contributions

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

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

following research fields

1. Multigrid methods for solving 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 development of a maximum-principle-based numerical optimization scheme for non-smooth control problems, the modelling of leadership-based control of multi-agent systems and opinion-formation models, a novel Nash game modelling of pedestrian motion, the development of new schemes for solving imaging problems, advances in the modelling of wine fermentation and its efficient control, and various theoretical and numerical analysis results with linear and nonlinear PDE models.
Present research topics also include optimal control of Boltzmann and other statistical-mechanical models and Monte-Carlo methods, differential games for multi-agent systems, optical microscopy, 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, Theory of Ordinary Differential Equations, Programming in C++, Numerical Analysis I and II, Theory of Partial Differential Equations, Optimal Control Theory, Numerical Linear Algebra, 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, Analysis and Implementation of Neural Networks.

I have been responsible to design and deliver series of PhD 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 National de Ecuador. `http://www.math.epn.edu.ec/doctorado/index.php/profesores`

- Administration of the Chair and co-administration of the Institute for Mathematics at JMU Würzburg.

Editor Duty

Associate Editor:
SIAM Journal on Scientific Computing (SISC) - until 2020 -
SIAM Review, Books section
Numerical Mathematics: Theory, Methods and Applications (NM-TMA).
Guest Editor of CVS, NLAA and NM:TMA.

Supervision of PhD Thesis

- **F. Calà Campana**, *Numerical methods for solving open-loop non zero-sum differential Nash games*, PhD Math. Thesis, Univ. Würzburg, 2021.
- **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 kinetic models and Monte-Carlo methods*, PhD Math. Thesis, ongoing.
- **Nadja Vater**, *Multilevel multiscale convolutional neural networks*, PhD Math. Thesis, ongoing.
- **Jacob Körner**, *Modelling and control of stochastic systems from behavioural epidemiology*, PhD Math. Thesis, ongoing.

- **Sebastian Hofmann**, *Probabilistic methodologies for neural networks*, PhD Math. Thesis, ongoing.

Supervision of Master Thesis (selection out of 20)

- **Hannah Weinmann**, *Ecosystem models and social balance from a synchronization perspective*, MSc Math. Thesis, Univ. Würzburg, 2021.
- **Sarah Winkelmann**, *Optimal design with Liouville equation for optical systems*, MSc Math. Thesis, Univ. Würzburg, 2021.
- **Sebastian Hofmann**, *Sequential quadratic Hamiltonian schemes for training Runge-Kutta structured neural networks*, MSc Math. Thesis, Univ. Würzburg, 2021.
- **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)

Ongoing:

- **Melissa Finster**, *Analysis of spatially distributed synchronised FitzHugh-Nagumo oscillators*, MSc Math. Thesis, ongoing.
- **Kristina Meth**, *Hyper-parameters optimisation of neural networks by evolutionary schemes*, MSc Math. Thesis, ongoing.
- **Anna Rauch**, *Hierarchical normalized cuts segmentation and classification by neural networks*, MSc Math. Thesis, ongoing.

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 (while on leave in U. Benevento), **Fast Multigrid Methods for Inverse Problems** (Project Leader, 2 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, Universite Paris-Dauphine , Paris, France. (ESF Grant 26.000 Eur)

- Multi-ITN STRIKE and WWCSC 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.
- SIAM Conference on Optimization (OP21), Spokane, Washington, U.S., 22.07. - 23.7.2021: Minisymposium: The Passage from Optimal Control to Differential Game Problems - Part I and II.

Some Invited Talks

- On ensemble optimal control problems with deterministic and stochastic kinetic models, SIMAI 2020+2021 Congress, Aug.-Sept. 2021, Parma, Italy.
- A new method to compute optimal relaxed controls, Minisyposium Nonsmoothness in PDE constrained optimization and variational inequalities, part of the 29th IFIP TC7 Conference on System Modelling and Optimization, Quito, Ecuador (Online)
- Super-resolution microscopy and mean-field Fokker-Planck equations for the reconstruction of cell membrane potentials, Department of Mathematics and Informatics, University of Catania, 30.07.2021, Catania, Italy.
- On solving dynamical Nash games using the Pontryagin maximum principle, SIAM Conference on Optimization (OP21), July 2021, Spokane, Washington, U.S. (Online)
- Continuity equations and super-resolution microscopy for the reconstruction of a cell membrane potential, Lomonosov State University and the Institute of Numerical Mathematics (INM) at the Steklov Institute of Mathematics, April 2021, Moscow, Russia. (Online)
- The sequential quadratic Hamiltonian scheme solving challenging optimal control problems, MODEMAT, Escuela Politécnica Nacional, October 2020, 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 Poincarè 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 Mathematik-didaktisches 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.
- Optimal control and function identification in the wine fermentation process, Kolloquium der Mathematik, Fakultät fuer Mathematik, Physik und Informatik der Universität Bayreuth, Oct. 2016, Germany.
- 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.

Scientific Outreach

Interviews in national newspapers

- Süddeutsche Zeitung, Section 'Panorama', 11. Oktober 2017, Nr. 234: **Alfio Borzì, 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

Interviews in University newspapers

- 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

Interviews in TV and Radio

- Bayerische Rundfunk Fernsehen, Frankenschau aktuell Das Wichtigste aus Franken, 14. März 2018: **Pi-Tag**; see also https://www.br.de/mediathek/video/frankenschau-aktuel 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=OOKMy9OzXuM
- **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=6chQrO2uInY&index=53&list=PL9kd4mpdvWcAMYt4Fhw0dgBPF24bQmDGz

Popularising Lectures and Books

- **Wissenschaftliches Rechnen am Beispiel der Weingärungs**, Marktbreit, 08.10.2014. (A lecture for the Winemakers Community on the modelling and efficient control of wine fermentation.)
- **Wissenschaftliches Rechnen in Würzburg**, Würzburg, 2015. (A lecture presenting scientific computing in Würzburg.) `https://www.mathematik.uni-wuerzburg.de/fileadmin/10040900/2019/ab_WiReMIX.pdf`
- **New Trends in Mathematics**, Staats- und Universitätsbibliothek der Universität Göttingen, 16.10.2015. (A lecture for Teachers on present research developments and trends in applied mathematics.)
- **Zufall und Spiele beim Spaziergehen**, Kinderuni Weil der Stadt, 16.05.2019, Weil der Stadt. (A lecture for children about random processes and games.) `https://www.mathematik.uni-wuerzburg.de/scientificcomputing/nachrichten/single/news/vortrag-an-der-kinderuni-weil-der-stadt/`
- **In den Brunnen gefallen beim Sterne schauen - Eine sehr kurze Geschichte der Mathematik -**. (A children book giving a short account of the early history of mathematics.)

Alfio Borzì 's Publications

Books

- A. Borzì, **The Sequential Quadratic Hamiltonian Method**, CRC/Chapman and Hall, 2022 (in preparation).
- A. Borzì, **Modelling with Ordinary Differential Equations: A Comprehensive Approach**, CRC/Chapman and Hall, 2020 (ISBN 9780815392613).
- A. Borzì, G. Ciaramella and M. Sprengel, **Formulation and Numerical Solution of Quantum Control Problems**, SIAM, Philadelphia, 2017 (ISBN 978-1-611974-83-6).
- A. Borzì and V. Schulz, **Computational Optimization of Systems Governed by Partial Differential Equations**, SIAM, Philadelphia, 2012 (ISBN 978-1-611972-04-7).
- A. Borzì and M. Wogrin, **Equazioni Differenziali Ordinarie**, Hevelius Edizioni, Benevento, 2009 (ISBN 978-88-86977-63-0).
- A. Borzì, **In den Brunnen gefallen beim Sterne schauen - Eine sehr kurze Geschichte der Mathematik -**, epubli, Berlin, 2017 (ISBN 978-3-7450-3862-0). (Also in English and Russian.)

Ten Selected Publications

- M. Annunziato and A. Borzì, **A Fokker-Planck control framework for multidimensional stochastic processes**, Journal of Computational and Applied Mathematics, 237 (2013), 487-507.
- J. Bartsch, A. Borzì, F. Fanelli, S. Roy, **A theoretical investigation of Brockett's ensemble optimal control problems**, Calculus of Variations and Partial Differential Equations, 58 (2019), pp.1-34. https://doi.org/10.1007/s00526-019-1604-2
- A. Borzì, **Multigrid methods for parabolic distributed optimal control problems**, Journal of Computational and Applied Mathematics, 157 (2003), 365-382.
- A. Borzì and G. Borzì, **Algebraic multigrid methods for solving generalized eigenvalue problems**, International Journal for Numerical Methods in Engineering, 65(8) (2006), 1186-1196.
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