

# DR DANTE KALISE

Senior Lecturer in Computational Optimisation and Control

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## RESEARCH AREAS: SCIENTIFIC COMPUTING, OPTIMIZATION & CONTROL

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FOUNDATIONS. Dynamic optimization with ODE/PDE constraints; large-scale and sparse optimization; mathematical control theory; high-dimensional approximation; numerical methods for Hamilton-Jacobi PDEs and dynamic programming; optimal transport, mean-field control/games.

APPLICATIONS. Scientific Machine Learning: data-driven control design in trajectory optimization, epidemiology, and large-scale dynamics. Agent-based models: nonlocal PDES, collective behaviour, consensus control. Nonlinear control design: power electronics, swarm robotics, reinforcement learning. Control of PDEs: fluid flow and vibration control, optimal actuator design.

## APPOINTMENTS

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Senior Lecturer	Department of Mathematics, AMMP Section Imperial College London, United Kingdom	7/2021–
Assistant Professor	School of Mathematical Sciences University of Nottingham, United Kingdom	6/2019–6/2021
Academic Fellow	Data Science Institute Imperial College London, United Kingdom	4/2018–
ICL Research Fellow	Department of Mathematics Imperial College London, United Kingdom	9/2017–5/2019
Research Scientist	Optimization and Optimal Control Group RICAM, Linz, Austria	5/2013–8/2017
Postdoctoral Researcher with Secondment	Sapienza University of Rome, Italy University of Bayreuth, Germany	11/2011–10/2012 11/2012–4/2013
Ph.D. Researcher	Research and Development Department Storm Weather Center, Norway	8/2008–10/2011
Lecturer	Department of Mathematics Federico Santa María University, Chile	3/2007–7/2008

## EDUCATION AND RELEVANT QUALIFICATIONS

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PhD	Mathematics	University of Bergen, Norway	6/2012
MSc	Electronic Engineering	Federico Santa María University, Chile	7/2008
BSc	Engineering Mathematics	Federico Santa María University, Chile	12/2006

### FURTHER QUALIFICATIONS

- 11/2020: attained Fellow status from Advance HE after completing 40 credits of PGCHE.
- 8/2018: obtained the National Scientific Habilitation in Numerical Analysis from the Italian Ministry of Education.

## FUNDED RESEARCH PROJECTS

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- PI, Imperial-CNRS Fund, Project: Towards A Quantitative Mean Field Game Framework for Pedestrian Dynamic, 10/2021–10/2023.
- CoI, EPSRC New Horizons Award, Project: Overcoming the Curse of Dimensionality with Tensor Decompositions, 3/2021–3/2024.
- CoI, UKRI-EPSRC COVID-19 Fund, Project: Optimal Lockdown, 8/2020–2/2022.
- CoI, EPSRC Grant, Project: Elastic Manufacturing Systems, 9/2020–9/2024.
- PI, Gaspard Monge Program for Optimization, Operations Research and Data Science, Project TIDAL: Taming the Curse of Dimensionality in Dynamic Programming Equations, 7/2019–7/2021.
- PI, Imperial College Research Fellowship: Multiscale optimal control of collective behaviour phenomena, 9/2017–5/2019.
- PI, Ser Cymru II Fellowship: Advanced computational methods for optimal feedback control with applications in engineering and life sciences.

## PARTICIPATION IN RESEARCH PROJECTS

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- Research Scientist, ERC-Advanced Grant OCLOC: From Open to Closed Loop Optimal Control of PDEs, PI: Karl Kunisch, 3/2016–7/2017.
- Research Scientist, START Project: Sparse Approximation and Optimization in High Dimensions, funded by the Austrian Research Fund (FWF), PI: Massimo Fornasier, 4/2009–6/2015.
- Experienced Researcher, Initial Training Network SADCO: Sensitivity Analysis for Deterministic Controller Design, funded by the European Union FP7, 1/2011–12/2014.
- Research Scientist, eVITA-EnKF Network: Forecasting non-linear systems using the ensemble Kalman filter and related methods, funded by the Research Council of Norway, 9/2007–9/2011.

## UNDERGRADUATE TEACHING EXPERIENCE

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- *School of Mathematical Sciences, University of Nottingham, UK* Autumn 2020  
Lecturer and course designer, *Optimization*. Includes a full syllabus re-design to account for current optimization trends in machine learning and data science.
- *School of Mathematical Sciences, University of Nottingham, UK* Spring 2020  
Lecturer, *Computerised Mathematical Methods in Engineering*.
- *Department of Computer Science, University of Verona, Italy* November 18–20, 2019  
Lecturer, *UG/PG short course: Optimisation and Control of Agent-based Dynamics*.
- *University of Applied Sciences of Upper Austria, Wels* November 2016 – February 2017  
Substitute Lecturer, *Applied Mathematics I*
- *Federico Santa María Technical University, Valparaíso, Chile* March 2007 – July 2008  
Lecturer, Department of Mathematics, semester courses: *Calculus*, *Differential Equations*, and *Multivariate Calculus*, for first and second year engineering students.

## GRADUATE TEACHING EXPERIENCE

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- *MAGIC Mathematics Taught Course Centre, UK* Autumn 2020  
Lecturer and course designer, graduate course: *Optimal Control and Reinforcement Learning*.
- *Department of Computer Science, University of Verona, Italy* June 2020  
Lecturer, short graduate course: *Mathematical Foundations of Reinforcement Learning*.
- *Department of Computer Science, University of Verona, Italy* November 26–30, 2018  
Lecturer, short graduate course: *Optimal Control of Multiscale Agent-Based Models*.
- *Department of Mathematics, Imperial College London* October–December, 2018  
Lecturer and designer, graduate course: *Mathematical Foundations of Reinforcement Learning*.
- *Max Ent Workshop, The Alan Turing Institute, London, UK* July 2–6, 2018  
Lecturer, *Tutorial on Mean Field Games*
- *SADCO-WIAS Young Researcher’s Workshop, WIAS, Berlin, Germany* January 29–31, 2014  
Lecturer, *Tutorial on Essentials of Reduced Order Modelling for Control Design*
- *Chair of Applied Mathematics, University of Bayreuth, Germany* February 2013  
Lecturer, short course: *Optimal Control of Infinite-Dimensional Dynamical Systems*
- *Department of Mathematics, La Sapienza University of Rome, Italy* May 2012  
Lecturer, short course: *Optimal Control of Infinite-Dimensional Dynamical Systems*

## RESEARCH SUPERVISION

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### POSTDOCTORAL RESEARCHERS

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- Luca Saluzzi, Postdoctoral research associate (Bath/Imperial, CoS: Sergey Dolgov) 05/21-02/23  
Project: Tensor Decomposition Methods for High-dimensional Dynamic Programming Equations.

### PHD STUDENTS

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- Sara Bicego, PhD in Mathematics (Imperial, CoS: Nikolas Kantas) starting 10/21  
Thesis: Deep Learning Methods for Hamilton-Jacobi-Bellman PDEs and Applications.
- Sattam Alrashidy, PhD in Mathematics (Nottingham, CoS: Kris van der Zee) starting 12/21  
Thesis: Optimization, Control and Estimation for Nonlinear PDEs in Transport Phenomena.
- Hamd Alsobhi, PhD in Mathematics (Nottingham, CoS: Kris van der Zee) ongoing  
Thesis: Minimal-residual Methods and Optimization.
- Cathie Wells, PhD Mathematics (ICL/Reading CDT, CoS: P. Williams and N. Nichols) ongoing  
Thesis: Optimization of Aircraft Trajectories and Fuel Consumption.  
10/2020: Cathie has received the Ivar Isaksen Prize at the 3rd ECATS Conference.

### MSc/MMATH STUDENTS

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- Frederik Kelbel, MSc Applied Mathematics (Imperial, CoS: Greg Pavliotis) 9/2021  
Thesis: Controlling agent-based Dynamics with a Deep Galerkin Feedback Law.
- Sara Bicego, MSc Mathematics (Verona, CoS: Giacomo Albi) 7/2021  
Thesis: Deep Learning for State-Dependent Riccati Equations.
- Gil Segev, MSc Mathematics (Nottingham) 7/2021  
Thesis: Deep Learning Algorithms for Optimal Feedback Laws.

- Harry North, MSc Mathematics (Nottingham) 7/2021  
Thesis: Physics-informed Neural Networks for the Eikonal Equation.
- Bradley Jackson, MSc Financial Computational Mathematics (Nottingham) 9/2020  
Thesis: Clustering Algorithms for Financial Risk Analysis.
- Denis Ogurtsov, MSc Financial Computational Mathematics (Nottingham) 9/2020  
Thesis: Agent-based Models for Volatility Clustering.
- Isaac Oldwood, MSc Statistics (Nottingham) 7/2020  
Thesis: A Statistical Machine Learning Framework for High Dimensional PDEs.
- Steven Kuijpers, MSc Applied Mathematics (Imperial, CoS: José A. Carrillo) 9/2019  
Thesis: Computational Methods for Optimal Transport.
- Maxence de Rochechouart, MSc Applied Mathematics (Imperial, CoS: Matías Delgadino) 9/2019  
Thesis: A Machine Learning Approach to the Numerical Approximation of PDEs.
- Jin Lee, MSc Applied Mathematics (Imperial, CoS: Diego Oyarzún) 9/2018  
Thesis: Identification of Basis of Attraction with Zubov's Method.
- Marco Casas, MSc Applied Mathematics (Imperial, CoS: José A. Carrillo) 9/2018  
Thesis: Optimal Cooperative Strategies in Multi-agent Systems.

## UNDERGRADUATE RESEARCH PROJECTS

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- Zeqi Wang, BSc Mathematics (University of Nottingham) 9/2018  
Undergraduate Research Experience (Imperial): Machine Learning for Collective Behaviour.
- Leonardo Mutti, BSc Engineering Mathematics (Politecnico di Milano) 9/2018  
Undergraduate Research Experience (Imperial): Modelling and Control of Social Dynamics.

## RESEARCH ACTIVITIES

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### RECENT TALKS AND CONFERENCES (2017 ONWARDS, \*= INVITED TALKS)

- \*Mathematical Data Science, Control and Optimization, KFU Graz, AT, 9/22.
- \*Numerical Aspects of Hyperbolic Balance Laws and Related Problems, Alba di Canazei, IT, 9/22.
- \*Mathematical Theory of Networks and Systems MTNS20, Cambridge, UK, 9/22 (semi-plenary).
- \*SIAM Conference on Analysis of Partial Differential Equations, TU Berlin, DE, 3/22.
- \*60th IEEE Conference on Decision and Control, Austin, US, 12/21.
- \*Ghana Numerical Analysis Seminar, University of Cape Coast, GH, 7/21.
- \*SIAM Conference on Control and Its Applications, Spokane, US, 7/21.
- \*Mini-Workshop: Analysis of Data-driven Optimal Control, Oberwolfach, DE, 5/21.
- \*Numerical Analysis Seminar, University of Bath, UK, 3/21.
- \*Third Multidisciplinary Workshop in Science and Engineering, UTEM, CL, 1/21.
- \*DMV Annual Meeting, Chemnitz, DE, 9/20.
- Seminario di Modellistica Differenziale Numerica, Sapienza University of Rome, IT, 7/20.
- \*Workshop on PDE-constrained Optimization, University of Edinburgh, UK, 5/20.
- Applied and Computational Mathematics Seminar, University of Edinburgh, UK, 1/20.
- PGMO Days, EDF'Lab Palaiseau, FR, 12/19.
- Special Semester on Optimization, RICAM Linz, AT, 10-12/19.
- \* Optimal Control & Mean Field Games, EMap/FGV, Rio de Janeiro, BR, 9/19.
- \* Computational Issues in Nonlinear Control, Naval Postgraduate School, Monterey, US, 9/19.

- \* 6th International Conference on Continuous Optimization, TU Berlin, DE, 8/19.
- \* International Congress on Industrial and Applied Mathematics, Valencia, ES, 7/19.
- 28th UK Numerical Analysis Conference, University of Strathclyde, UK, 6/19.
- \* British Applied Mathematics Colloquium, University of Bath, UK, 4/19.
- Mean-field games, Energy Systems, and Other Applications, ICMS Edinburgh, UK, 4/19.
- \* Control Theory and Applications, Gran Sasso Science Institute L'Aquila, IT, 3/19.
- 90th GAMM Annual Meeting, TU Vienna, AT, 2/19.
- Scientific Machine Learning, ICERM Brown, US, 1/19.
- \* From Interacting Particle Systems to Kinetic Equations, University of Verona, IT, 11/18.
- \* Algorithms and Applications of High-dimensional Approximation, University of Bath, 11/18.
- \* Mathematics and Applications Sussex Seminar, University of Sussex, UK, 11/18.
- \* Numerical Analysis Seminar, University of Strathclyde, UK, 10/18.
- \* Research Program on Mathematical Biology, Mittag-Leffler Institut, SE, 9-10/18.
- \* LMS Applied Algebra and Geometry Meeting, Swansea University, UK, 9/18.
- \* IFIP TC 7 Conference on System Modelling and Optimization, Essen, DE, 7/18.
- \* 12th AIMS Conference on Dynamical Systems, Taipei, TW, 7/18.
- \* Max Ent Workshop, The Alan Turing Institute, UK, 7/18.
- Curves and Surfaces 2018, Arcachon, FR, 6/18.
- International Conference on Boundary and Interior Layers, University of Strathclyde, UK, 6/18.
- IEEE International Conference on Control and Automation 2018, Anchorage, US, 6/18.
- \* Oxford Numerical Analysis Seminar, University of Oxford, UK, 5/18.
- \* UK-Japan Workshop on Analysis of Nonlinear PDEs, Swansea University, UK, 5/18.
- \* Lagrangian and Hamiltonian Methods for Nonlinear Control, FSMTU, Valparaíso, CL, 5/18.
- \* XXXII Jornadas de Matemática de la Zona Sur, Austral University of Chile, CL, 4/18.
- \* Seminario ECCO, los Andes University, CO, 4/18.
- \* Computational and Geometric Design and Optimal control, del Rosario University, CO, 4/18.
- \* Challenges in Optimal Control of Nonlinear PDE-Systems, Oberwolfach, DE, 4/18.
- 89th GAMM Annual Meeting, TU Munich, DE, 3/18.
- \* Biomathematics Seminar, Imperial College London, UK, 1/18.
- \* Mathematics of Planet Earth CDT Seminar, Imperial College London, UK, 1/18.
- \* Mathematics Seminar, Federico Santa María Technical University, CL, 12/17.
- \* Applied Mathematics Seminar, University of Warwick, UK, 11/17.
- \* Applied and Numerical Analysis Seminar, Imperial College London, UK, 10/17.
- 19th ÖMG-DMV Congress, University of Salzburg, AT, 9/17.
- \* IFAC 2017 World Congress, Toulouse, FR, 7/17.
- 27th UK Numerical Analysis Conference, University of Strathclyde, UK, 6/17.
- \*Scientific Computing and Numerics Seminar, Cornell University, US, 5/17.
- \* Control Theory Seminar, University of Waterloo, CA, 4/17.
- \* SIAM Conference on Computational Science and Engineering, Georgia, US, 2/17.

#### VISITING RESEARCH POSITIONS

- Centre of Mathematics for Applications, University of Oslo, NO, 8/2009–8/2011.
- Laboratory of Applied Mathematics, University of Trento, IT, 5/2010–10/2010.
- Center for Scientific Studies, Valdivia, CL, 1/2007–2/2007.

## RESEARCH VISITS

- School of Mathematics, University of Edinburgh, UK (2/2020).
- Mittag-Leffler Institute, Djursholm, SE (10/2018).
- MFO, Oberwolfach Research Institute for Mathematics, DE (4/2018).
- Department of Mathematics, University of Graz, AT (2/2018, 5/2018).
- Warwick Mathematics Institute, University of Warwick, US (11/2017).
- Laboratoire Jacques-Louis Lions, Paris VI University, FR (11/2017, 4/2018).
- Department of Mathematics, Cornell University, US (5/2017).
- Department of Applied Mathematics, University of Waterloo, CA (4/2017).
- Institute for Geometry and Applied Mathematics, RWTH Aachen University, DE (9/2016).
- Department of Mathematics, Swansea University, UK (8/2016).
- Faculty of Mathematics, Technical University of Munich, DE (7/2016).
- Institute for Mathematics and Scientific Computing, University of Graz, AT (5/2016).
- Chair of Applied Mathematics , University of Bayreuth, DE (7/2015).
- Department of Mathematics and Computer Sciences, University of Limoges, FR (5/2015).
- Department of Mathematics, University of Hamburg, DE (11/2014).
- Department of Mathematics, University of Konstanz, DE (9/2014).
- Chilean Nuclear Energy Commission, Santiago, CL (7/2014).
- Leibniz Institute for Tropospheric Research, Leipzig, DE (12/2012).
- Department of Applied Mathematics, ENSTA Paristech, Paris, FR (10/2012).

## OTHER PROFESSIONAL ACTIVITIES

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### EDITORIAL DUTIES

- Since 12/2019, Associate Editor of Mathematics of Control, Signals, and Systems (Springer). Co-editor of 2 special issues: "Machine Learning for Control Systems and Optimal Control" and "Optimal Control and Dynamic Games: Large Time Behavior and Geometry".
- Since 6/2021, Associate Editor of Advances in Discrete and Continuous Models (Springer), Control section.

### LEADERSHIP AND MANAGEMENT ROLES

- Since September 2021, Learning, Computation, and Control Seminar organizer (Imperial).
- Since August 2020, Course Director for the Machine Learning in Science MSc (University of Nottingham). I oversee our teaching provision and coordinate with the departments of Physics and Computer Science.
- Since July 2019, Scientific Computation Seminar organizer (University of Nottingham).

### OUTREACH

- 2021** Our paper *A Mobility-Based Approach to Optimize Pandemic Lockdown Strategies* has been featured in PLOS Computational Biology, see the press release [here](#).
- 2021** Speaker at "Skype a Scientist" events, delivering online talks to primary schools around the world.
- 2021** Speaker the outreach online event "insight4me Mathematics: Mathematical Modelling", with the talk "Mathematical Optimization: the best of all possible worlds".

- 2021** Our paper *Reducing transatlantic flight emissions by fuel-optimised routing* has been reported by over 30 news outlets around the world <https://tinyurl.com/pw33d3u8>, and has been discussed by NATS, the main traffic controller in the United Kingdom.
- 2020** Speaker at “Ciencias para la Innovación” (Science for Innovation) Event, Sub-Antartic Consortium of Chilean Universities, Ciencia 2030 Programme.
- 2018** Mathematics Speaker, Open Days at Imperial College London.
- 2018** Participant at Science in Parliament - STEM for Britain: <http://www.setforbritain.org.uk>.
- 2016** An article by the Austrian Press Agency about my research on a computational approach for the control of social dynamics and collective behavior is available at: <http://science.orf.at/stories/2815032/>.
- 2016** The paper *Invisible control of self-organizing agents leaving unknown environments* has received considerable attention by the media: six popular science magazines including the Italian version of Scientific American (<http://tinyurl.com/z59kujm>), and a press release at the Technical University of Munich (<http://tinyurl.com/zf9sw5g>), highlighting our research in agent-based modelling of social dynamics.
- 2014** Within the workshop *Geometric control and related fields* (November 17-21, 2014 at RICAM), I co-organized the public lecture *Historical chronology: Truth or fable?*, which attracted a diverse audience interested on the links between Mathematics, Celestial Mechanics, and Historical Chronology. More details can be found at <http://tinyurl.com/ztg5fau>.
- 2014** I gave the public talk *High-resolution numerical methods and applications in Optimization and Control* at the Science/Technology Interaction Cycle of the Chilean Nuclear Energy Commission, raising awareness within nuclear research practitioners on the use of state of the art computational methods.
- 2012** My Ph.D. in computational methods for atmospheric modelling was developed in co-supervision with the R&D Department of StormGeo AS ([www.stormgeo.com](http://www.stormgeo.com)), a leading weather forecast company in Scandinavia. During this period I participated in the formulation of tender bid proposals for high-resolution wind forecast systems for wind farms in South America.

#### ORGANIZATION OF SCIENTIFIC MEETINGS

- Member of the Programme Committee, 25th International Symposium on Mathematical Theory of Networks and Systems MTNS2022., Bayreuth, DE.
- Co-organizer of the workshop *Feedback Control of PDEs*, November 2019, RICAM, Linz, Austria.
- Co-organizer of the minisymposium *Novel Concepts in Model-driven Optimization and Control of Agent-based Systems* at the International Congress of Industrial and Applied Mathematics ICIAM, July 15–19 2019, Valencia, Spain.
- Co-organizer of the minisymposium *Computation methods for model-driven optimization and control under uncertainty* at the 28th Biennial Numerical Analysis Conference, June 25th–28th 2019, University of Strathclyde, Glasgow, United Kingdom.
- Co-organizer of the minisymposium *Numerical Methods for PDE-Constrained Optimization* at the 27th Biennial Numerical Analysis Conference, June 27th–30th 2017, University of Strathclyde, Glasgow, United Kingdom.
- Co-organizer of the minisymposium *Numerical Approximation and Optimization of Agent-based Models* at the 27th Biennial Numerical Analysis Conference, June 27th–30th 2017, University of Strathclyde, Glasgow, United Kingdom.
- Co-organizer of the workshop *Numerical methods for Hamilton-Jacobi equations in optimal control and related fields*, November 21st–25th 2016, RICAM, Linz, Austria.

- Co-organizer of the minisymposium *Recent developments in numerical methods for Hamilton-Jacobi-Bellman equations and multi-agent systems*, at the 5th Workshop on Numerical Analysis of Partial Differential Equations, January 11th–15th 2016, University of Concepción, Chile.
- Member of the Organizing Committee of the *Workshop on Optimal Control of Partial and Ordinary Differential Equations*, November 16th–17th 2015, École Polytechnique, Palaiseau, France.
- Co-organizer of the minisymposium *Optimal control and Hamilton-Jacobi-Bellman equations*, at the 27th IFIP TC7 Conference, June 29th–July 3rd 2015, Sophia-Antipolis, France.
- Co-organizer of the minisymposium *Modelling and Control of Multi-agent Systems*, at the 27th IFIP TC7 Conference, June 29th–July 3rd 2015, Sophia-Antipolis, France.
- Organizer of the minisymposium *Numerical methods for feedback control of dynamical systems and related topics* at the 26th Biennial Numerical Analysis Conference, June 23rd–26th 2015, University of Strathclyde, Glasgow, United Kingdom.
- Member of the Local Organizing Committee of the workshop *Geometric Control and Related Fields*, November 17th–21st 2014, RICAM, Linz, Austria.
- Organizer of the session: *Numerical Methods for Atmospheric Models* at the 14th International Conference on Hyperbolic Problems, June 25th–29th 2012, Padova, Italy.

#### PARTICIPATION IN PHD THESIS COMMITTEES

Guillermo Albuja (PhD Mathematics, Universidad de la Frontera, Chile), 2021.  
 Bartosz Jaroszkowski (PhD Mathematics, University of Sussex, United Kingdom), 2021.  
 Luca Saluzzi (PhD Mathematics, Gran Sasso Science Institute, Italy), 2020.  
 Daniel Inzunza (PhD Mathematical Engineering, Universidad de Concepción, Chile), 2019.

#### REFEREING FOR RESEARCH FUNDING AGENCIES

National Commission for Scientific and Technological Research (CONICYT/ANID-Chile), Engineering and Physical Sciences Research Council (EPSRC-UK).

#### REFEREING FOR PEER-REVIEWED JOURNALS

Foundations of Computational Mathematics	Discrete and Continuous Dynamical Systems - A
SIAM Journal on Numerical Analysis	BIT Numerical Mathematics
SIAM Journal on Optimization and Control	IEEE Transactions on Control Systems Technology
SIAM Journal on Scientific Computing	IEEE Control Systems Letters
SIAM/ASA Journal on Uncertainty Quantification	ZAMM
Multiscale Modeling and Simulation	Calcolo
Inverse Problems	Physica A
Automatica	Applied Mathematics and Computation
Mathematical Control and Related Fields	Applied Numerical Mathematics
Applied Mathematics & Optimization	Mathematics and Computers in Simulation
Journal of Optimization Theory and Applications	Computational and Applied Mathematics
Kinetic and Related Models	Optimization and Engineering
ESAIM: COCV	Royal Society Open Science
ESAIM: M2AN	Optimization
Computational Optimization and Applications	Operational Research: An International Journal
Computers and Mathematics with Applications	European Control Conference
Advances in Computational Mathematics	Analysis and Mathematical Physics
Mathematical Control & Related Fields	Reviewer for MathScinet
Numerical Linear Algebra with Applications	Book Proposals Reviewer for CRC Press
IMA Journal on Applied Mathematics	Book Proposals Reviewer for Springer
Set-Valued and Variational Analysis	Book Proposals Reviewer for SIAM
	Book Reviews for SIAM Review



## COMPLETE PUBLICATION LIST

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Up-to-date preprint versions available at <https://www.dkalise.net/publications>

### EDITED VOLUMES:

M. Heinkenschloss, R. Herzog, D. Kalise, G. Stadler and E. Trélat (eds.) *Optimization and Control for Partial Differential Equations: Uncertainty quantification, open and closed-loop control, and shape optimization*, De Gruyter - Radon Series on Computational and Applied Mathematics, in progress.

D. Kalise, K. Kunisch and Z. Rao (eds.) *Hamilton-Jacobi-Bellman Equations: Numerical Methods and Applications in Optimal Control*, Vol. 21 De Gruyter - Radon Series on Computational and Applied Mathematics, 2018.

M.S. Aronna, D. Kalise, and D. Tonon (eds.) *Novel Directions in Optimization, Control and Games with Applications*, Lecture Notes in Mathematics, Springer, 2017.

### PREPRINTS:

D. Kalise, N.K. Nichols, D.I.A. Poll, C.A. Wells and P.D. Williams. *The role of airspeed variability in fixed-time, fuel-optimal trajectory planning*, 35pp., submitted, 2021.

A. Alla, D. Kalise and V. Simoncini. *State-dependent Riccati equation feedback stabilization for nonlinear PDEs*, arXiv:2101.01970, 2021.

G. Albi, M. Herty, D. Kalise and C. Segala. *Moment-driven predictive control for mean-field collective dynamics*, arXiv:2101.01970, 2021.

J.A. Carrillo, D. Kalise, F. Rossi and E. Trélat. *Controlling swarms towards flocks and mill*, arXiv:2103.07304, 2021.

Y.-P. Choi, D. Kalise and A. Peters. *Collisionless and Decentralized Formation Control for Strings*, arXiv:2102.13621, 2021.

### PEER-REVIEWED INDEXED PAPERS:

R. Dutta, S.N. Gomes, D. Kalise and L. Pacchiardi. *Using mobility data in the design of optimal lockdown strategies for the COVID-19 pandemic*, PLoS Computational Biology 17(8): e1009236, 2021.

M. S. Edalatzadeh, D. Kalise, K. A. Morris and K. Sturm. *Optimal Actuator Design for the Euler-Bernoulli Vibration Model Based on LQR Performance and Shape Calculus*, IEEE Control Systems Letters 6(2022):1334–1339.

G. Albi, S. Bicego and D. Kalise. *Gradient-augmented Supervised Learning of Optimal Feedback Laws Using State-dependent Riccati Equations*, IEEE Control Systems Letters 6(2022): 836 –841.

S. Dolgov, D. Kalise and K. Kunisch. *Tensor Decomposition Methods for High-dimensional Hamilton-Jacobi-Bellman Equations*, SIAM Journal on Scientific Computing 43(3)(2021): A1625–A1650.

B. Azmi, D. Kalise and K. Kunisch. *Optimal Feedback Law Recovery by Gradient-Augmented Sparse Polynomial Regression*, Journal of Machine Learning Research 22(48)(2021):1–32.

D. Kalise, N. Nichols, I. Poll, C.A. Wells and P.D. Williams. *Reducing transatlantic flight emissions by fuel-optimised routing*, Environmental Research Letters 16:025002, 2021.

D. Kalise, K. Kunisch and Z. Rao. *Sparse and switching infinite horizon optimal control with mixed-norm penalizations*, ESAIM: Control, Optimisation and Calculus of Variations 26(61)(2020).

- D. Kalise, K. Kunisch and S. Kundu. *Robust feedback control of nonlinear PDEs by polynomial approximation of Hamilton-Jacobi-Isaacs equations*, SIAM Journal on Applied Dynamical Systems 19(2)(2020):1496–1524.
- Y. P. Choi, D. Kalise, A. Peters and J. Peszek. *A collisionless singular Cucker-Smale model with decentralized forcing and applications to formation control for UAVs*, SIAM Journal on Applied Dynamical Systems 18(4)(2019):1954–1981.
- L. Briceño-Arias, D. Kalise, Z. Kobeisi, M. Laurière, A. Mateos-González and F.J. Silva, *On the implementation of a primal-dual algorithm for second order time-dependent mean field games with local couplings*, ESAIM: Proceedings and Surveys 65(2019):330–348.
- D. Kalise, K. Kunisch and K. Sturm. *Optimal actuator design based on shape calculus*, Mathematical Models and Methods in Applied Sciences 28(13)(2018): 2667–2717.
- J.A. Carrillo, M. Bongini, D. Kalise and R. Bailo. *Optimal consensus control of the Cucker-Smale model*, IFAC-PapersOnLine 51(3)(2018):1–6.
- L. Briceño-Arias, D. Kalise, and F.J. Silva. *Proximal methods for stationary Mean Field Games with local couplings*, SIAM Journal on Control and Optimization 56(2)(2018):801–836.
- D. Kalise and K. Kunisch. *Polynomial approximation of high-dimensional Hamilton-Jacobi-Bellman equations and applications to feedback control of semilinear parabolic PDEs*, SIAM Journal on Scientific Computing 40(2)(2018):A629–A652.
- G. Albi and D. Kalise *(Sub)Optimal feedback control of mean-field multi-population dynamics: a Boltzmann-Bellman approach*, IFAC-PapersOnLine 51(3)(2018):86–91.
- G. Albi, Y. P. Choi, M. Fornasier and D. Kalise. *Mean field control hierarchy*, Applied Mathematics & Optimization 76(1)(2017):93–135.
- D. Kalise, K. Kunisch, and Z. Rao. *Infinite horizon sparse optimal control*, Journal of Optimization Theory and Applications 172(2)(2017):481–517.
- G. Albi, M. Fornasier and D. Kalise. *A Boltzmann approach to mean-field sparse feedback control*, IFAC-PapersOnLine 50(1)(2017):2898–2903.
- G. Albi, M. Bongini, E. Cristiani, and D. Kalise. *Invisible control of self-organizing agents leaving unknown environments*, SIAM Journal on Applied Mathematics 76(4)(2016):1683–1710.
- D. Kalise, A. Kröner, and K. Kunisch. *Local minimization algorithms for dynamic programming equations*, SIAM Journal on Scientific Computing 38(3)(2016):A1587–A1615.
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