

Biographical Sketch – Andreas Mang

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APPOINTMENTS

2023–present	Associate Professor	Department of Mathematics, University of Houston
2017–2023	Assistant Professor	Department of Mathematics, University of Houston

EDUCATION

University of Texas at Austin, TX, US	Computational Sciences & Engineering	Postdoc 2013–2017
University of Lübeck, Lübeck, DE	Computational Sciences & Engineering	Ph.D. (Dr.-Ing.) 2013

PUBLICATIONS

Summary: 24 peer-reviewed journal papers; 23 peer-reviewed conference papers; and 1 book.

Selected Journal Articles

15. **A. Mang**, J. He & R. Azencott. *An operator-splitting approach for variational optimal control formulations for diffeomorphic shape matching*. Journal of Computational Physics 493:112463, 2023.
arXiv:[arXiv:2307.10114](https://arxiv.org/abs/2307.10114) doi:[10.1016/j.jcp.2023.112463](https://doi.org/10.1016/j.jcp.2023.112463)
14. P. Zhang, **A Mang**, J. He, R. Azencott, K. C. El-Tallawi, & W. A. Zoghbi. *Diffeomorphic shape matching by operator splitting in 3D cardiology imaging*. Journal of Optimization Theory and Applications, 188:143–168, 2021.
arXiv:[arXiv:2011.10165](https://arxiv.org/abs/2011.10165) doi:[10.1007/s10957-020-01789-5](https://doi.org/10.1007/s10957-020-01789-5)
13. M. Brunn, N. Himthani, G. Biros, M. Mehl & **A. Mang**. *Fast GPU 3D diffeomorphic image registration*. Journal of Parallel and Distributed Computing, 149:149–162, 2021.
arXiv:[arXiv:2004.08893](https://arxiv.org/abs/2004.08893) doi:[10.1016/j.jpdc.2020.11.006](https://doi.org/10.1016/j.jpdc.2020.11.006)
12. **A. Mang**, S. Bakas, S. Subramanian, G. Biros & C. Davatzikos. *Integrated biophysical modeling and image analysis: Application to neuro-oncology*. Annual Review of Biomedical Engineering, 22:309–341, 2020.
arXiv:[arXiv:2002.09628](https://arxiv.org/abs/2002.09628) doi:[10.1146/annurev-bioeng-062117-121105](https://doi.org/10.1146/annurev-bioeng-062117-121105)
11. K. Scheufele, S. Subramanian, **A. Mang**, G. Biros & M. Mehl. *Image-driven biophysical tumor growth model calibration*. SIAM Journal on Scientific Computing, 42(3):B549–B580, 2020.
arXiv:[arXiv:1907.07774](https://arxiv.org/abs/1907.07774) doi:[10.1137/19M1275280](https://doi.org/10.1137/19M1275280)
10. **A. Mang**, A. Gholami, C. Davatzikos & G. Biros. *CLAIRE: A distributed-memory solver for constrained large deformation diffeomorphic image registration*. SIAM Journal on Scientific Computing, 41(5):C548–C584, 2019.
arXiv:[arXiv:1808.04487](https://arxiv.org/abs/1808.04487) doi:[10.1137/18M1207818](https://doi.org/10.1137/18M1207818)
9. K. Scheufele, **A. Mang**, A. Gholami, C. Davatzikos, G. Biros & M. Mehl. *Coupling brain-tumor biophysical models and diffeomorphic image registration*. Computer Methods in Applied Mechanics and Engineering, 237:533–567, 2019.
arXiv:[arXiv:1710.06420](https://arxiv.org/abs/1710.06420) doi:[10.1016/j.cma.2018.12.008](https://doi.org/10.1016/j.cma.2018.12.008)

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8. **A. Mang**, A. Gholami, C. Davatzikos & G. Biros. *PDE-constrained optimization in medical image analysis*. Optimization and Engineering, 19(3):765–812, 2018.
arXiv:[1803.00058](#) doi:[10.1007/s11081-018-9390-9](#)
 7. **A. Mang** & G. Biros. *A semi-Lagrangian two-level preconditioned Newton–Krylov solver for constrained diffeomorphic image registration*. SIAM Journal on Scientific Computing, 39(6):B1064–B1101, 2017.
arXiv:[1604.02153](#) doi:[10.1137/16M1070475](#)
 6. **A. Mang** & L. Ruthotto. *A Lagrangian Gauss–Newton–Krylov solver for intensity- and mass-preserving diffeomorphic image registration*. SIAM Journal on Scientific Computing, 39(5):B860–B885, 2017.
arXiv:[1703.04446](#) doi:[10.1137/17M1114132](#)
 5. **A. Mang** & G. Biros. *Constrained H^1 -regularization schemes for diffeomorphic image registration*. SIAM Journal on Imaging Sciences, 9(3):1154–1194, 2016.
arXiv:[1503.00757](#) doi:[10.1137/15M1010919](#)
 4. A. Gholami, **A. Mang**, & G. Biros. *An inverse problem formulation for parameter estimation of a reaction-diffusion model for low grade gliomas*. Journal on Mathematical Biology, 72(1):409–433, 2016.
arXiv:[1408.6221](#) doi:[10.1007/s00285-015-0888-x](#)
 3. **A. Mang** & G. Biros. *An inexact Newton–Krylov algorithm for constrained diffeomorphic image registration*. SIAM Journal on Imaging Sciences, 8(2):1030–1069, 2015.
arXiv:[1408.6299](#) doi:[10.1137/140984002](#)
 2. T. A. Schuetz, **A. Mang**, S. Becker, A. Toma & T. M. Buzug. *Identification of crucial parameters in a mathematical multiscale model of glioblastoma growth*. Computational Mathematics and Methods in Medicine, 2014(2014):437094, 2014.
doi:[10.1155/2014/437094](#)
 1. **A. Mang**, A. Toma, T. A. Schuetz, S. Becker, C. Mohr, T. Eckey, D. Petersen & T. M. Buzug. *Biophysical modeling of brain tumor progression: From unconditionally stable explicit time integration to an inverse problem with parabolic PDE constraints for model calibration*. Medical Physics, 39(7):4444–4460, 2012.
doi:[10.1118/1.4722749](#)

Selected Conference Contributions

8. M. Brunn, N. Himthani, G. Biros, M. Mehl & **A. Mang**. *Multi-node multi-GPU diffeomorphic image registration for large-scale imaging problems*. Proc ACM/IEEE Conference on Supercomputing, pp. 523–539, 2020.
arXiv:[2008.12820](#) doi:[10.1109/SC41405.2020.00042](#)
7. A. Gholami, **A. Mang**, K. Scheufele, C. Davatzikos, M. Mehl, & G. Biros. *A framework for scalable biophysics-based image analysis*. Proc ACM/IEEE Conference on Supercomputing, 19:1–19:13, 2017.
doi:[10.1145/3126908.3126930](#)
6. **A. Mang**, A. Gholami & G. Biros. *Distributed-memory large-deformation diffeomorphic 3D image registration*. Proc ACM/IEEE Conference on Supercomputing, pp. 842–853, 2016.
arXiv:[1608.03630](#) doi:[10.1109/SC.2016.71](#)
5. **A. Mang**, T. A. Schuetz, S. Becker, A. Toma & T. M. Buzug. *Cyclic numerical time integration in variational non-rigid image registration based on quadratic regularisation*. Proc Vision Modeling and Visualization Workshop, pp. 143–150, 2012.
doi:[10.2312/PE/VMV/VMV12/143-150](#)

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4. A. Toma, A. Régnier-Vigouroux, **A. Mang**, S. Becker, T. A. Schuetz & T. M. Buzug. *In-silico modelling of tumour-immune system interactions for glioblastomas*. Proc International Conference on Mathematical Modeling, pp. 1237–1242, 2012.
doi:[10.3182/20120215-3-AT-3016.00219](https://doi.org/10.3182/20120215-3-AT-3016.00219)
 3. T. A. Schuetz, S. Moeller, S. Becker, **A. Mang** & A. Toma. *A cross-scale model of tumor growth: Do we need to model molecular interactions in separate artificial compartments within a cell?* Proc International Conference on Mathematical Modeling, pp. 1294–1299, 2012.
doi:[10.3182/20120215-3-AT-3016.00230](https://doi.org/10.3182/20120215-3-AT-3016.00230)
 2. T. A. Schuetz, S. Becker, **A. Mang**, A. Toma & T. M. Buzug. *A computational multiscale model of glioblastoma growth: Regulation of cell migration and proliferation via microRNA-451, LKB1 and AMPK*. Proc International Conference of the IEEE Engineering and Medicine in Biology Society, pp. 6620–6623, 2012.
doi:[10.1109/EMBC.2012.6347512](https://doi.org/10.1109/EMBC.2012.6347512)
 1. A. Toma, **A. Mang**, T. A. Schuetz, S. Becker & T. M. Buzug. *Is it necessary to model the matrix degrading enzymes for simulating tumour growth?* Proc Vision Modeling and Visualization Workshop, pp. 361–368, 2011.
doi:[10.2312/PE/VMV/VMV11/361-368](https://doi.org/10.2312/PE/VMV/VMV11/361-368)

Books

1. **A. Mang**. *Methoden zur numerischen Simulation der Progression von Gliomen: Modellentwicklung, Numerik und Parameteridentifikation*. Springer, 2014.
doi:[10.1007/978-3-658-05246-1](https://doi.org/10.1007/978-3-658-05246-1)

Selected Other Publications

1. S. Bakas, M. Reyes, A. Jakab, S. Bauer, M. Rempfler, et al. *Identifying the best machine learning algorithms for brain tumor segmentation, progression assessment, and overall survival prediction in the BRATS challenge*. arXiv preprint, 2019 (49 pages).
arXiv:[1811.02629](https://arxiv.org/abs/1811.02629)

RESEARCH GRANTS

- 2022 **CAREER: Scalable Algorithms for nonlinear, large-scale inverse problems governed by dynamical systems** (DMS 2145845). *Funding Agency*: National Science Foundation (NSF; Division of Mathematical Sciences) | *Program*: Computational Mathematics (program solicitation NSF 20-525) | *PI*: A. Mang (UHouston; Single Investigator) | *Awarded Funds*: ~\$100K/year for 5 years (total: ~\$500K) | *Funding Period*: 08/01/2022–07/31/2027.
- 2020 **Analysis and simulation of extremes and rare events in complex systems** (DMS 2009923). *Funding Agency*: National Science Foundation (NSF; Division of Mathematical Sciences) | *Program*: Applied Mathematics (program solicitation PD 16-1266) | *PI*: M. Nicol (UHouston) | *Co-PIs*: R. Azencott (UHouston), A. Mang (UHouston) | *Awarded Funds*: ~\$120K/year for 3 years (total: ~\$370K) | *Funding Period*: 07/15/2020–06/30/2023.
- 2020 **Fast algorithms for nonlinear optimal control of geodesic flows of diffeomorphisms** (DMS 2012825). *Funding Agency*: National Science Foundation (NSF; Division of Mathematical Sciences) | *Program*: Computational Mathematics (program solicitation PD 16-127) | *PI*: A. Mang (UHouston; Single Investigator) | *Awarded Funds*: ~\$95K/year for 3 years (total: ~\$300K) | *Funding Period*: 07/01/2020–06/30/2023.

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- 2019 *GPU-accelerated solvers for non-linear optimal control problems*. Sponsor: NVIDIA Corporation | Program: GPU Grant Program (Accelerated Data Science Call) | PI: A. Mang (UHouston; Single Investigator) | Awarded Hardware: 2 NVIDIA Titan V VOLTA 12GB HBM2 Video Cards (~\$6K)
- 2019 *Data mining for large data sets of shape deformations* (DMS 1854853). Funding Agency: National Science Foundation (NSF; Division of Mathematical Sciences) | Program: Computational and Data-Enabled Science and Engineering in Mathematical and Statistical Sciences (CDS&E-MSS; program solicitation PD 16-8069) | PI: R. Azencott (UHouston) | Co-PI: J. He (UHouston), A. Mang (UHouston) | Awarded Funds: ~\$133K/year for 3 years (total: ~\$400K) | Funding Period: 08/01/2019–07/31/2022
- 2018 *Integrated methods for data analytics and inversion in image computing* (#586055). Sponsor: Simons Foundation | Program: Mathematics and Physical Sciences—Collaboration Grants for Mathematicians | PI: A. Mang (UHouston; Single Investigator) | Awarded Funds: \$8,400/year for 5 years (total: \$42K) | Funding Period: 09/01/2018–08/31/2019 (award expired due to NSF DMS-1854853).

AWARDS & HONORS (selected)

- 2023 *Award for Excellence in Research, Scholarship and Creative Activity* (Assistant Professor Level). Division of Research, University of Houston.
- 2022 *NSM Junior Faculty Award for Excellence in Research*. College of Natural Sciences and Mathematics, University of Houston.
- 2022 *NSF CAREER Award*. National Science Foundation, Division of Mathematical Sciences.
- 2017 *SC17 Best Student Paper Award*.
Publication: A framework for scalable biophysics-based image analysis | Authors: A. Gholami, A. Mang, K. Scheufele, C. Davatzikos, M. Mehl & G. Biros | Venue: International Conference for High Performance Computing, Networking, Storage and Analysis, Denver, CO, USA | Role: Co-Author.

INVITED & CONTRIBUTED TALKS (selected)

44. *CLAIRE: Scalable algorithms for diffeomorphic image registration*. Contributed talk at the SIAM Conference on Uncertainty Quantification (UQ24; Session: *Computational Tools for Large-Scale Inverse Problems and UQ*), Trieste, IT, 2024.
43. *Fast algorithms for nonlinear optimal control of geodesic flows of diffeomorphisms*. Contributed talk at the U.S. National Congress on Computational Mechanics (USNCCM7; Session: *Recent Advances in Large-Scale Optimal Engineering Design*), Albuquerque, NM, 2023.
42. *Shape classification through the lens of geodesic flows of diffeomorphisms*. Invited talk (hosts: D. Labate (UHouston), B. Tatiana (UBath), S. D. V. Rea (Centro de Investigación en Matemática)) at workshop entitled “Leveraging Model- and Data-Driven Methods in Medical Imaging” at Banff International Research Station for Mathematical Innovation and Discover, CA, 2023.
41. *Scalable algorithms for inverse problems governed by dynamical systems*. Invited talk (host: C. M. Neuhauser) at DSI’s webinar at the HPE Data Science Institute, University of Houston, Houston, TX, 2023.

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40. *Deep neural networks for Bayesian inverse problems governed by nonlinear ODEs*. Invited talk (hosts: A. S. Giovanni (UGenoa), A. Andrea (UMilan), B. Tatiana (UBath), R. Luca (UBologna), S. Matteo (UGenoa)) at workshop entitled "Learning for Inverse Problems" at Istituto Nazionale di Alta Matematica, Rome, IT, 2023.
 39. *Efficient numerical methods for optimal control problems governed by geodesic flows of diffeomorphisms*. Invited colloquium talk (host: J. Rudi) at the Department of Mathematics, Virginia Tech, Blacksburg, VA, US, 2023.
 38. *Efficient numerical methods for optimal control problems governed by geodesic flows of diffeomorphisms*. Invited talk (host: S. Foucart) at Center for Approximation and Mathematical Data Analytics, Texas A&M University, College Station, TX US, 2023.
 37. *Fast algorithms for optimal control problems governed by geodesic flows of diffeomorphisms*. Invited talk (host: S. Shontz) at Mathematical Methods and Interdisciplinary Computing Center (MMICC) at the University of Kansas, Lawrence, KS, US 2023.
 36. *Numerical methods for PDE-constrained optimization problems governed by hyperbolic equations*. Invited colloquium talk (host: J. R. Romero) at the Department of Mathematical Sciences, University of Puerto Rico, Mayaguez Campus, US, 2023.
 35. *CLAIRE: Scalable multi-GPU algorithms for diffeomorphic image registration in 3D*. Invited talk (host: D. Gunay) in Applied and Computational Mathematics Division (ACMD) Seminar Series at the National Institute of Standards and Technology (NIST), Boulder, CO, US, 2023.
 34. *Deep learning for Bayesian inverse problems governed by nonlinear differential equations*. Contributed talk at SIAM Conference on Computational Sciences and Engineering (CSE23; Session: *Uncertainty Quantification for Data-Intensive Inverse Problems and Learning*), Amsterdam, NL, 2023.
 33. *CLAIRE: Scalable multi-GPU algorithms for diffeomorphic image registration* Contributed talk at Joint Mathematics Meetings (JMM23; Session: *SIAM Minisymposium on Imaging and Inverse Problems*); Boston, MA, US, 2023.
 32. *Fast algorithms for nonlinear optimal control of geodesic flows of diffeomorphisms*. Invited colloquium talk (host: H. Antil) at CMAI Colloquium at the Center for Mathematics and Artificial Intelligence, George Mason University, Fairfax, VA, US, 2022.
 31. *Randomized algorithms for efficient preconditioning and uncertainty quantification in inverse transport problems*. Contributed talk at SIAM Conference on Mathematics of Data Science (MDS22; Session: *Randomized Methods in Large-Scale Inference and Data Problems*); San Diego, CA, US, 2022.
 30. *Fast algorithms for initial value control problems for diffeomorphic image registration*. Contributed talk at Copper Mountain Conference on Iterative Methods (CM22; Session: *Efficient Optimization Algorithms*), Virtual Conference, 2022.
 29. *Fast algorithms for initial value control problems*. Contributed talk at SIAM Conference on Imaging Sciences (IS22; Session: *Partial Differential Equations and Control Problems*), Virtual Conference, 2022.
 28. *CLAIRE: Scalable multi-GPU algorithms for diffeomorphic image registration in 3D*. Contributed talk at SIAM Conference on Optimization (OPT21; Session: *Large-Scale Optimization for Inverse Problems and Learning in Medical Imaging*), Virtual Conference, 2021.
 27. *Uncertainty quantification for inverse transport problems*. Contributed talk at SIAM Conference on Computational Sciences and Engineering (CSE21; Session: *Uncertainty Quantification for Data-Intensive Inverse Problems and Learning*), Virtual Conference, 2021.

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26. *Fast algorithms for nonlinear optimal control of geodesic flows of diffeomorphisms*. Invited talk (hosted by T. Bui-Thanh; Oden Seminar) at the Oden Institute for Computational Engineering and Sciences, University of Texas at Austin, Virtual Seminar, 2021.
 25. *Fast GPU-accelerated diffeomorphic image registration in 3D*. Contributed talk at SIAM Conference on Imaging Science (IS20; Session: *Fast Algorithms for inverse problems and their applications*), Virtual Conference, 2020.
 24. *Automatic classification of 3D shapes and shape deformations*. Contributed talk at SIAM Conference on Mathematics in Data Science (MDS20; Session: *Integration of Model- and Data-Based Methods in Medical Imaging*), Virtual Conference, 2020.
 23. *Estimating oncogenic parameters via biophysical brain tumor growth modeling*. Invited talk (hosted by S. Bakas) at Annual Meeting of the Society for Neuro-Oncology (Session: *Computational Neuro-Oncology*), Phoenix, US, AZ, 2019.
 22. *Fast algorithms for nonlinear optimal control for diffeomorphic registration*. Invited talk (hosted by R. Herzog and E. Trélat) at RICAM's Special Semester on Optimization (organized by E. Sachs and K. Kunisch; Workshop: *New trends in PDE-constrained optimization*), Johann Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, 2019.
 21. *Uncertainty quantification in non-linear optimal control problems for diffeomorphic registration*. Contributed talk at AMS Fall Central Sectional Meeting (Session: *Uncertainty Quantification Strategies for Physics Applications*), University of Wisconsin, Madison, WI, 2019.
 20. *Fast algorithms for nonlinear optimal control for diffeomorphic registration*. Invited talk (hosted by C. Brune) at Department of Mathematics (DAMUT Colloquium), University of Twente, Enschede, NL, 2019.
 19. *Fast algorithms for initial value control problems in image registration*. Contributed talk at Applied Inverse Problems (AIP) Conference (Session: *Analysis and fast numerical methods for inverse problems and their applications*), Grenoble, FR, 2019.
 18. *Diffeomorphic shape matching: Fast algorithms for non-linear optimal control problems*. Invited talk (hosted by M. Mougeot) at Éléments de mathématique pour l'intelligence artificielle, École Normale Supérieure, Paris-Saclay, Cachan, FR, 2019.
 17. *Parallel algorithms for hyperbolic PDE-constrained optimization problems*. Contributed talk at International Workshop on Parallel Matrix Algorithms and Applications (PMAA; Session: *Krylov and regularization methods for large scale inverse problems*), ETH Zuerich, Zuerich, CH, 2018.
 16. *CLAIRE: A parallel solver for constrained large deformation diffeomorphic image registration*. Invited talk (hosted by M. Schulte) at Department of Computer Science at University of Stuttgart, Stuttgart DE, 2018.
 15. *CLAIRE: A parallel solver for constrained large deformation diffeomorphic image registration*. Contributed talk at SIAM Conference on Imaging Sciences (IS18; Session: *Diffeomorphic image registration: Numerics, applications, and theory*), Bologna, IT, 2018.
 14. *Computational mathematics meets medicine: Formulations, numerics, and parallel computing*. Invited talk (hosted by J. Nagy) at Numerical Analysis and Scientific Computing Seminar at Department of Mathematics & Computer Science, Emory University, Atlanta, GA, US, 2018.
 13. *CLAIRE: A distributed-memory solver for constrained diffeomorphic image registration*. Invited colloquium talk (hosted by J. Chan) at Computational and Applied Mathematics Department, Rice University, Houston, TX, US, 2018.

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12. *Parallel algorithms for PDE-constrained optimization problems with hyperbolic constraints*. Contributed talk at SIAM Conference on Computational Science and Engineering (CSE17; Session: *Fast solvers for large-scale inverse problems in imaging*), Atlanta, GA, US, 2017.
 11. *A distributed-memory Newton–Krylov solver for constrained diffeomorphic image registration*. Contributed talk at Applied Inverse Problems (AIP) Conference (Session: *Fast algorithms for numerical simulation and their applications in inverse problem*), Hangzhou, CN, 2017.
 10. *Preconditioners for the reduced space Hessian in hyperbolic optimal control problems*. Contributed talk at International Conference on Preconditioning Techniques for Scientific and Industrial Applications (Session: *Preconditioning methods in large-scale ill-posed inverse problems*), Vancouver, CA, 2017.
 9. *Efficient evaluation of Hessian operators arising in large-scale inverse transport problems*. Contributed talk at SIAM Conference on Uncertainty Quantification (UQ16; Session: *Uncertainty quantification and inversion of multiphysics and multiscale problems*), Lausanne, CH, 2016.
 8. *Fast solvers for constrained diffeomorphic image registration*. Contributed talk at SIAM Conference on Imaging Sciences (IS16; Session: *Efficient algorithms for large-scale inverse problems in medical imaging*), Albuquerque, NM, US, 2016.
 7. *Fast algorithms for diffeomorphic image registration*. Contributed talk at Workshop on Numerical Methods for Optimal Control and Inverse Problems, Technical University Munich, Munich, DE, 2016.
 6. *A parallel solver for inverse transport problems*. Invited talk (hosted by L. Ruthotto) at Numerical Analysis and Scientific Computing Seminar at Department of Mathematics & Computer Science, Emory University, Atlanta, GA, US, 2016.
 5. *Efficient algorithms for optimal control based diffeomorphic image registration*. Contributed talk at Workshop on Numerical Methods for Optimal Control and Inverse Problems, Technical University Munich, Munich, DE, 2015.
 4. *Efficient algorithms for physically constrained diffeomorphic image registration*. Contributed talk at SIAM Conference on Computational Science and Engineering (CSE15; Session: *Efficient algorithms for variational methods in imaging*), Salt Lake City, UT, US, 2015.
 3. *Optimal control meets medical imaging sciences: Applications, formulations and fast solvers*. Invited lecture (hosted by B. Menze) at Institute of Medical Engineering, Technical University Munich, Munich, DE, 2015.
 2. *Image-based modeling of brain tumour progression: From individualization to priors for non-rigid image registration*. Contributed talk at SIAM Conference on Imaging Science (IS12; Session: *Mathematical challenges in 4D imaging*), Philadelphia, PA, US, 2012.
 1. *Image-based modelling of tumor growth*. Invited talk (hosted by J. Modersitzki) at Institute of Mathematics and Image Computing, University of Lübeck, Lübeck, DE, 2011.

TEACHING, STUDENT LEARNING & ADVISING

Legend for Majors: *MATH*: Mathematics | *CSEM*: Computational Science, Engineering, and Mathematics | *CS*: Computer Science | *MMLS*: Mathematics in Medicine and Life Sciences | *ST*: Simulation Technology | *(BM|M|E|I)E*: (Biomedical|Mechanical|Electrical|Industrial) Engineering.

Legend for Scholarships: *SURF*: Summer Undergraduate Research Fellowship | *PURS* Provost's Undergraduate Research Scholarship.

Courses Taught

University	Number	Title	Units	Class	Size	SM-YR
UHouston	MATH 2318	Linear Algebra	3	UG	60	Sp-24
	MATH 6397	Comp. & Math. Methods in Data Science	3	GR	32	Sp-24
	MATH 6366	Optimization Theory	3	GR	25	Fa-23
	MATH 2318	Linear Algebra	3	UG	59	Sp-23
	MATH 6397	Bayesian Inverse Problems & UQ ^a	3	GR	17	Sp-23
	MATH 6366	Optimization Theory	3	GR	20	Fa-22
	MATH 3336	Discrete Mathematics	3	UG	80	Sp-22
	MATH 3336	Discrete Mathematics	3	UG	100	Fa-21
	MATH 6366	Optimization Theory	3	GR	25	Fa-21
	MATH 3336	Discrete Mathematics	3	UG	99	Sp-21
	MATH 6397	Applied Inverse Problems ^a	3	GR	16	Fa-20
	MATH 6366	Optimization Theory	3	GR	11	Fa-20
	MATH 2331	Linear Algebra	3	UG	75	Sp-20
	MATH 6366	Optimization Theory	3	GR	29	Fa-19
	MATH 2331	Linear Algebra	3	UG	71	Sp-19
	MATH 6366	Optimization Theory	3	GR	20	Fa-18
	ULübeck	MATH 2331	Linear Algebra	3	UG	36
MATH 2331		Linear Algebra	3	UG	81	Fa-17
		Image Processing	2	GR	20	Su-12
		Image Processing	2	GR	30	Su-11
		Image Processing ^a	2	GR	17	Su-10
		Imaging and Image Processing ^b	2	GR	14	Su-09
		Imaging and Image Processing ^{a,b}	2	GR	15	Su-08

a: new course; *b*: co-taught;

Student Mentoring

Postdoctoral Research Associates

2018–2019 James L. Herring (MATH):

Optimal Control & Inverse Problems (Current employment: Research Scientist at Slingshot Aerospace, El Segundo, CA, USA; <https://slingshotaerospace.com>).

PhD Academic Adviser (Ongoing)

- Jannatul Ferdous Chhoa (MATH): *Optimal Control & Inverse Problems*
- Li Meng (MATH): *Bayesian Inference*

Academic Adviser for Graduate Students (Ongoing)

PhD Academic Adviser

- **German Villalobos**: *Scientific machine learning for Bayesian inverse problems governed by the FitzHugh–Nagumo model* (<https://hdl.handle.net/10657/16107>), Department of Mathematics, University of Houston, 08/20–12/23. Current employment: Data Scientist at Layer Scaffolding, Houston, TX, USA; <https://layherna.com>.

- **Jae Youn Kim:** *Efficient numerical methods for initial value control problems for diffeomorphic image registration* (<https://hdl.handle.net/10657/15999>), Department of Mathematics, University of Houston, 08/19–08/23. Current employment: Adjunct Lecturer, Department of Mathematics, University of Houston, TX, USA; <https://www.math.uh.edu>.
- **Saeed (Sorena) Sarmadi** (co-advised w/R. Azencott (UHouston)): *Stochastic neural networks for cell tracking in video recordings of bacterial colonies* (<https://hdl.handle.net/10657/7991>), Department of Mathematics, University of Houston, 12/17–12/20. Current employment: Vice President of Artificial Intelligence, NthsDS, Houston, TX, USA; <https://www.nthds.com>.

Graduate Research Projects (Master Tutorials, Reading Courses & Internships)

- 2022 Mandana Delavari (MATH): *Randomized Linear Algebra*
- 2021 Muhammad Adil Chaudry (MATH): *Optimal Control & Inverse Problems*
- 2021 Hossein Dabirian (MATH; co-advised w/R. Azencott & J. He (UHouston)): *Machine Learning*
- 2018 Erin Gabrysch (MATH; co-advised w/A. Quaini (UHouston)): *PDEs*
- 2017 Homaymoon Shobeiri (MATH; co-advised w/R. Azencott (UHouston)): *Image Computing*
- 2017 Klaudius Scheufele (CS; PhD adviser: M. Schulte (UStuttgart)): *Inverse Problems*

Academic Adviser for MSc Theses

- 2018 Felix Huber (ST; co-advised w/M. Schulte (UStuttgart)): *Optimal Control*
- 2013 Jenny Stritzel (MMLS; co-advised w/T. M. Buzug (ULuebeck)): *Inverse Problems*
- 2011 Maik Stille (CS; co-advised w/W. R. Crum (KCL)): *Image Computing*
- 2009 Jan O. Jungmann (CS; co-advised w/T. M. Buzug (ULuebeck)): *PDEs*
- 2009 Stefan Becker (CS; co-advised w/T. M. Buzug (ULuebeck)): *PDEs*
- 2007 Leila Ghaderi (BME; co-advised w/T. M. Buzug (ULuebeck)): *Image Computing*

Academic Adviser for Undergraduate Research Projects

- 2023 Brayan A. Gutierrez (MATH: SURF recipient): *Bayesian Inference*
- 2022 Danial H. Khan (MATH: SURF recipient): *Variational Bayesian Inference*
- 2021 Gundeep Singh (CS; PURS recipient): *Optimization & Machine Learning*
- 2021 Syed Abidi (MATH; PURS & SURF recipient): *Optimization & Machine Learning*
- 2021 Yaseen Syed (MATH; PURS recipient): *Kernel Methods*
- 2020 Haley Rosso (MATH; SURF recipient): *Inverse Problems*
- 2019 Gundeep Singh (CS): *Numerical Optimization & Machine Learning*
- 2018 Orion Lowy (CS; co-advised w/B. Bodmann (UHouston)): *Image Computing*
- 2018 Brenda Gonzalez (CS; SURF recipient): *Machine Learning*
- 2015 Naveen Himthani (ME; co-advised w/G. Biros (UTAustin)): *PDEs*
- 2015 Krishan Mittal (ME; co-advised w/G. Biros (UTAustin)): *PDEs*
- 2014 Ioanis Tsonas (EE; co-advised w/G. Biro (UTAustin)s): *Image Computing*

Academic Adviser for BSc Theses

- 2013 Philip Klein (BME; co-advised w/T. M. Buzug (ULuebeck)): *Image Computing*
- 2010 Thomas Polzin (MMLS; co-advised w/T. M. Buzug (ULuebeck)): *Image Computing*
- 2010 Viktor Wottschel (BME; co-advised w/T. M. Buzug (ULuebeck)): *Image Computing*

PhD Committee Member

- 2023 Ivan Ezhov (CS; adviser: B. H. Menze (UZuerich))
- 2023 Nickolas Fularczyk (MATH; adviser: D. Labate (UHouston))
- 2023 Yewen Huang (MATH; adviser: D. Labate (UHouston))
- 2023 Jennifer Ruhnow May (MATH; adviser: B. Bodmann (UHouston))
- 2022 Seyyed Mahmood Ghasemi (MATH; adviser: R. Azencott (UHouston))
- 2022 Alexander Zhiliakov (MATH; adviser: M. Olshanskii (UHouston))
- 2022 Yingxue Su (MATH; adviser: R. Azencott (UHouston))
- 2022 Naveen Himthani (CSEM; adviser: G. Biros (UTAustin))
- 2021 Zahed Shahmoradi (IE; adviser: T. Lee (UHouston))
- 2021 Xiaoqian Chen (MATH; adviser: I. Timofeyev (UHouston))
- 2021 Neil Jerome A. Egarguin (MATH; adviser: D. Onofrei (UHouston))
- 2020 Wilfredo J. Molina (MATH; adviser: D. Labate (UHouston))
- 2020 Kazem Safaripoorfatide (MATH; adviser: D. Labate (UHouston))
- 2020 Basanta Pahari (MATH; adviser: D. Labate (UHouston))
- 2020 Sabrine Hoteit Assi (MATH; adviser: D. Labate (UHouston))
- 2019 Peng Zhang (MATH; advisers: R. Azencott (UHouston) & J. He (UHouston))
- 2019 Kayla M. Bicol (MATH; adviser: A. Quaini (UHouston))
- 2018 Nikolaos Mitsakos (MATH; adviser: M. Papadakis (UHouston))

SERVICE TO PROFESSION

Editorial Service

- 2023– Member of Editorial Board of [Advances in Continuous and Discrete Models](#) (ACDM).
- 2021– Member of Editorial Board of the [AIMS Journal of Numerical Algebra, Control and Optimization](#) (AIMS NACO).

Review Activity

Review Activity for Journals (Selected)

SIAM Journal on Scientific Computing ([link](#)) • SIAM Journal on Imaging Sciences ([link](#)) • Journal of Scientific Computing ([link](#)) • AIMS Inverse Problems and Imaging ([link](#)) • AIMS Journal of Numerical Algebra, Control and Optimization ([link](#)) • Applied Mathematics and Computation ([link](#)) • Applied Numerical Mathematics ([link](#)) • IMA Journal of Applied Mathematics ([link](#)) • Optimization and Engineering ([link](#)) • Transactions on Mathematical Software ([link](#)) • Computer Vision and Image Understanding ([link](#)) • Journal of Mathematical Imaging and Vision ([link](#)) • Computer Methods in Applied Mechanics & Engineering ([link](#)) • Mathematical & Computer Modelling ([link](#)) • Signal Processing ([link](#)) • SIAM Undergraduate Research Online ([link](#))

Reviewer and Panelist for Federal Funding Agencies

- Panelist for the [National Science Foundation](#)
 - [Directorate for Mathematical and Physical Sciences](#) (two panels)
 - [Directorate for Computer and Information Science and Engineering](#) (one panel).

Organization of Conferences, Workshops & Minisymposia

- 2024 Co-organization (w/A. Arnold (WPI)) of mini-symposium *Uncertainty Quantification for Large-Scale Inverse Problems Governed by Dynamical Systems* at [SIAM Conference on Uncertainty Quantification](#), Trieste, IT.
- 2024 Organization of SIAM session *Mathematical Methods in Computer Vision and Image Analysis* at the [Joint Mathematics Meeting](#), San Francisco, CA, US.
- 2023 Co-organization (w/A. Mamonov (UHouston) & D. Onofrei (UHouston)) of mini-symposium *Data- and Model-Driven Approaches for Inverse Problems* at [SIAM TX-LA Annual Conference](#), Lafayette, LA, US.
- 2023 Co-organization (w/G. Biros (UTAustin)) of mini-symposium *Recent Advances in Variational and Data-Driven Methods for Inverse Problems* at [SIAM Conference on Optimization](#), Seattle, WA, US.
- 2023 Co-organization (w/J. Rudi (VirginiaTech) & T. Bui-Thanh (UTAustin)) of mini-symposium *Uncertainty Quantification for Data-Intensive Inverse Problems and Learning* at [SIAM Conference on Computational Sciences and Engineering](#), Amsterdam, NL.
- 2023 Co-organization (w/G. Biros (UTAustin), M. Mehl (UStuttgart) & B. Menze (ETH Zürich)) of Dagstuhl Seminar *Inverse Biophysical Modeling and Machine Learning* (seminar 23022) at [Schloss Dagstuhl](#), DE.
- 2022 Co-organization (w/A. Mamonov (UHouston) & D. Onofrei (UHouston)) of mini-symposium *Recent Advances in Large-Scale Inverse Problems: Numerics, Theory, and Applications* at [SIAM TX-LA Annual Conference](#), Houston, TX, US.
- 2022 Member of the organizing committee of the 5th [SIAM TX-LA Annual Conference](#) at the University of Houston, Houston, TX.
- 2022 Member of the program committee of the [MICCAI BrainLes Workshop 2022](#), a satellite event of the [International Conference on Medical Image Computing and Computer Assisted Intervention](#) (MICCAI).
- 2022 Co-organization (w/D. Labate (UHouston)) of mini-symposium *Integration of Model and Data-Driven Methods with Applications in Imaging* at [SIAM Conference on Mathematics of Data Science](#), San Diego, CA, US.
- 2022 Co-organization (w/T. Bui-Thanh (UTAustin)) of mini-symposium *Uncertainty Quantification for Data-Intensive Inverse Problems and Machine Learning* at [World Congress on Computational Mechanics](#) (WCCM-APCOM 2022), Yokohama, JP.
- 2022 Co-organization (w/G. Biros (UTAustin) & M. Schulte (UStuttgart)) of mini-symposium *Recent Advances on Integrating Optimization, Learning, and Modeling with Medical Imaging* at [SIAM Conference on Imaging Sciences](#); virtual conference.
- 2022 Co-organization (w/N. Charon (John Hopkins)) of mini-symposium *Shape Matching, Shape Analysis, and Morphometry: Theory, Numerics, and Applications* at [SIAM Conference on Imaging Sciences](#); virtual conference.
- 2021 Member of the program committee of the [MICCAI BrainLes Workshop 2021](#), a satellite event of the [International Conference on Medical Image Computing and Computer Assisted Intervention](#) (MICCAI).
- 2021 Co-organization (w/G. Biros (UTAustin)) of mini-symposium *Large-Scale Optimization for Inverse Problems and Learning in Medical Imaging* at [SIAM Conference on Optimization](#); virtual conference.

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- 2021 Co-organization (w/H. Goh (UTAustin) & T. Bui-Thanh (UTAustin)) of mini-symposium *Uncertainty Quantification for Data-Intensive Inverse Problems and Learning* at [SIAM Conference on Computational Sciences and Engineering](#); virtual conference.
- 2020 Co-organization (w/S. Subramanian (UTAustin)) of mini-symposium *Recent Advances in Inverse Problems: Numerics, Theory, and Applications* at [SIAM TX-LA Sectional Meeting](#); virtual conference.
- 2020 Co-organization (w/D. Labate (UHouston)) of mini-symposium *Integration of Model-Based and Data-Based Methods with Medical Imaging* at [SIAM Conference on Mathematics of Data Science](#); virtual conference.
- 2019 Co-organization (w/T. Bui-Thanh (UTAustin)) of minisymposium *Recent advances in inverse problems & imaging* at [SIAM TX-LA Sectional Meeting](#), Southern Methodist University, Dallas, TX, US.
- 2019 Co-organization (w/J. Herring (UHouston)) of minisymposium *Fast iterative methods for large-scale inverse problems in imaging* at [International Congress on Industrial and Applied Mathematics](#), Valencia, ES.
- 2019 Co-organization (w/J. Herring (UHouston)) of minisymposium *Numerical methods for optimal control problems in imaging* at [Applied Inverse Problems Conference](#), Saint-Martin-d'Hères, FR.
- 2019 Co-organization (w/J. Herring (UHouston) and G. Biros (UTAustin)) of minisymposium *Fast solvers for inverse problems with PDEs* at [SIAM Conference on Computational Sciences and Engineering](#), Spokane, WA, US.
- 2018 Co-organization (w/G. Biros (UTAustin)) of minisymposium *Diffeomorphic image registration: Numerics, applications, and theory* at [SIAM Conference on Imaging Sciences](#), Bologna, IT.
- 2017 Co-organization (w/G. Biros (UTAustin)) of minisymposium *Fast solvers for large-scale inverse problems in imaging* at [SIAM Conference on Computational Sciences and Engineering](#), Atlanta, GA, US.
- 2016 Co-organization (w/G. Biros (UTAustin)) of minisymposium *Efficient algorithms for large-scale inverse problems in medical imaging* at [SIAM Conference on Imaging Sciences](#), Albuquerque, NM, US.
- 2015 Co-organization (w/G. Biros (UTAustin)) of minisymposium *Efficient algorithms for variational methods in imaging* at [SIAM Conference on Computational Sciences and Engineering](#), Salt Lake City, UT, US.

Academic and Professional Memberships

- American Mathematical Society ([AMS](#))
- Association for Computing Machinery ([ACM](#))
- Society of Industrial and Applied Mathematics ([SIAM](#))
- Pi Mu Epsilon ([PME](#))

UNIVERSITY SERVICE

University of Houston

- Member of *Faculty Search Committees* for tenure-track positions (4 committees).
- Member of the *Graduate Studies Committee* (academic years: 2020, 2021, 2022, 2023).
- Co-organization (w/D. Labate & M. Papadakis) of *Data-Enabled Science Seminar*, since SP20.
- Co-organization (w/D. Labate & M. Papadakis) of *Image Analysis Seminar*, SP18–FA19.
- Judge for the *Graduate Paper Presentations* organized by the UH SIAM and UH AMS Student Chapters, SP18, SP22.

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- Faculty Adviser for the *Texas Theta Chapter* of Pi Mu Epsilon (**PME**) since SP18.
 - Member of *Colloquium Committee* since FA17.

OUTREACH

- Participation in *Math and Science Family Night* at the Durham Elementary School, Houston, TX, SP23.
- Talk *Making Waves with Mathematics* at Mega-Mathletes event organized by the Mu Alpha Theta National Honor Society at the Stephen F. Austin High School, Houston, TX, SP20.