

Josua Sassen | CURRICULUM VITÆ

ENS Paris-Saclay – 4 Avenue des Sciences – 91190 Gif-sur-Yvette – France
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Research Experience

Centre Borelli

MathInGreaterParis Postdoctoral Fellow

Mentored by Alain Trouvé; Part of the MathInGreaterParis Fellowship Program cofunded by the Marie Skłodowska-Curie Actions in the framework of the European Horizon 2020 Program

École normale supérieure Paris-Saclay

since October 2023

Institute for Numerical Simulation (INS)

Research Assistant

Supervised by Prof. Dr. Martin Rumpf

University of Bonn

May 2019 – September 2023

Computer Science Department

Visiting Researcher

Visiting the group of Prof. Keenan Crane

Carnegie Mellon University

October 2021 – December 2021

Collaborative Research Centre 1060 / INS

Student Research Assistant

Supervised by Prof. Dr. Martin Rumpf

University of Bonn

November 2018 – April 2019

Group Numerical Data-Driven Prediction

Student Research Assistant

Supervised by Prof. Dr. Jochen Garcke

Fraunhofer SCAI

October 2016 – August 2017, April 2018 – March 2019

Education

Ph.D. in Mathematics

Advisor: Prof. Dr. Martin Rumpf

Title of thesis: “Riemannian Calculus and Shape Optimization on the Space of Discrete Surfaces”

University of Bonn

May 2019 – May 2023

Master of Science in Mathematics

Advisor: Prof. Dr. Martin Rumpf

Master’s thesis: “Discrete Gauß–Codazzi Equations for Efficient Triangle Mesh Processing”

University of Bonn

October 2016 – April 2019

Bachelor of Science in Mathematics

Advisor: Prof. Dr. Daniel Huybrechts

Bachelor’s thesis: “Resolution of Singularities” in Algebraic Geometry

University of Bonn

October 2013 – September 2016

Publications

Preprints & Submitted Manuscripts

1. Samuel Weidemaier, Florine Hartwig, Josua Sassen, Sergio Conti, Mirela Ben-Chen, and Martin Rumpf. “SDFs from Unoriented Point Clouds using Neural Variational Heat Distances”. 2025. arXiv: 2504.11212 [math.NA].
2. Samuel Gruffaz and Josua Sassen. “Riemannian Metric Learning: Closer to You than You Imagine”. 2025. arXiv: 2503.05321 [stat.ML].
3. Martin Rumpf, Josua Sassen, and Christoph Smoch. “A Hybrid Minimizing Movement and Neural Network Approach to Willmore Flow”. 2025. arXiv: 2502.14656 [math.NA].

Peer-Reviewed

4. Sandrine H. Sassen, Josua Sassen, Marlene Saßmannshausen, Lukas Goerdt, Yannick Liermann, Raffael G. Liegl, Philipp Herrmann, Robert P. Finger, Frank G. Holz, and Sarah Thiele. “Early Photoreceptor Alterations Following Retinal Detachment Repair”. In: *Investigative Ophthalmology & Visual Science* 66.9 (2025). DOI: 10.1167/iovs.66.9.32.
5. Josua Sassen, Henrik Schumacher, Martin Rumpf, and Keenan Crane. “Repulsive Shells”. In: *ACM Transaction on Graphics* 43.4 (2024). **Best Paper Award at SIGGRAPH 2024**. DOI: 10.1145/3658174.

6. Florine Hartwig, Josua Sassen, Omri Azencot, Martin Rumpf, and Mirela Ben-Chen. "An Elastic Basis for Spectral Shape Correspondence". In: *ACM SIGGRAPH 2023 Conference Proceedings* (2023). DOI: 10.1145/3588432.3591518.
7. Josua Sassen, Klaus Hildebrandt, Martin Rumpf, and Benedikt Wirth. "Parametrizing Product Shape Manifolds by Composite Networks". In: *International Conference on Learning Representations* (2023). **Spotlight Paper (Notable Top 25%)**. arXiv: 2302.14665. URL: https://openreview.net/forum?id=F_EhNDSamN.
8. Johanna Burtscheidt, Matthias Claus, Sergio Conti, Martin Rumpf, Josua Sassen, and Rüdiger Schultz. "A Pessimistic Bilevel Stochastic Problem for Elastic Shape Optimization". In: *Mathematical Programming* 198.2 (2023). DOI: 10.1007/s10107-021-01736-w.
9. Sandrine H. Künzel, Moritz Lindner, Josua Sassen, Philipp T. Möller, Lukas Goerdts, Matthias Schmid, Steffen Schmitz-Valckenberg, Frank G. Holz, Monika Fleckenstein, and Maximilian Pfau. "Association of Reading Performance in Geographic Atrophy Secondary to Age-Related Macular Degeneration With Visual Function and Structural Biomarkers". In: *JAMA Ophthalmology* (2021). DOI: 10.1001/jamaophth.12021.3826.
10. Janos Meny, Martin Rumpf, and Josua Sassen. "A Phase-field Approach to Variational Hierarchical Surface Segmentation". In: *Computer Aided Geometric Design* 89 (2021). DOI: 10.1016/j.cagd.2021.102025.
11. Josua Sassen, Klaus Hildebrandt, and Martin Rumpf. "Nonlinear Deformation Synthesis via Sparse Principal Geodesic Analysis". In: *Computer Graphics Forum (Proc. SGP)* 39.5 (2020). DOI: 10.1111/cgf.14073.
12. Josua Sassen, Behrend Heeren, Klaus Hildebrandt, and Martin Rumpf. "Geometric Optimization using Nonlinear Rotation-Invariant Coordinates". In: *Computer Aided Geometric Design* 77 (2020). DOI: 10.1016/j.cagd.2020.101829.

Other.....

13. Josua Sassen. "A Phase-field Approach to Optimal Reinforcing Networks". In: *Oberwolfach Reports* 2506 (2025). DOI: 10.14760/OWR-2025-5.
14. Josua Sassen. "Riemannian Calculus and Shape Optimization on the Space of Discrete Surfaces". PhD thesis. University of Bonn, 2023. DOI: 20.500.11811/10960.
15. Josua Sassen. "Repulsive Shells". In: *Oberwolfach Reports* 2234 (2022). DOI: 10.14760/OWR-2022-38.
16. Josua Sassen, Behrend Heeren, Klaus Hildebrandt, and Martin Rumpf. "Solving Variational Problems Using Nonlinear Rotation-Invariant Coordinates". In: *Symposium on Geometry Processing 2019 – Posters*. The Eurographics Association, 2019. DOI: 10.2312/sgp.20191213.
17. Josua Sassen. "Discrete Gauß–Codazzi Equations for Efficient Triangle Mesh Processing". Master's Thesis. University of Bonn, 2019.

Awards & Honors

SIGGRAPH 2024 Best Paper Award

Association for Computing Machinery

August 2024

Awarded in recognition of our paper *Repulsive Shells*. Only 5 such awards are given out from a pool of about 840 submissions.

GlobalMathNetwork — Exchange Scholarship

Hausdorff Center for Mathematics

October 2021

Funded 3 months research stay in the group of Keenan Crane at Carnegie Mellon University

Oberwolfach Leibniz Graduate Student

Mathematisches Forschungsinstitut Oberwolfach

May 2020

Oberwolfach Workshop on Mathematical Imaging and Surface Processing 2022

SIAM Student Travel Award

Society for Industrial and Applied Mathematics

December 2019

SIAM Conference on Analysis of Partial Differential Equations 2019

Talks & Posters

Seminar of the RTG Energy, Entropy, and Dissipative Dynamics <i>Talk: Repulsive Shells</i>	RWTH Aachen, Germany May 2025
MFO Workshop on Mathematical Imaging and Surface Processing <i>Talk: A Phase-field Approach to Optimal Reinforcing Networks</i>	Oberwolfach, Germany February 2025
Paris Shape Analysis Seminar <i>Talk: Repulsive Shells</i>	Paris, France November 2024
SMAI SIGMA Workshop 2024 <i>Talk: Riemannian Calculus on Latent Manifolds</i>	CIRM, Luminy, France October 2024
Greater Paris Postdocs in Mathematics Welcome Day <i>Talk: The Space of Discrete Surfaces without Intersections</i>	IHP, Paris, France October 2024
Shape Analysis Meetup <i>Talk: Repulsive Shells</i>	TU Munich, Germany (virtual) September 2024
Workshop on Geometric Sciences in Action <i>Talk: Low-dimensional Product Submanifolds of the Space of Discrete Shells</i>	CIRM, Luminy, France May 2024
Paris Shape Analysis Seminar <i>Talk: Shape Optimization on Discrete Surfaces</i>	Paris, France April 2024
GAMM Workshop on Phase-field Modelling <i>Talk: A Phase-field Approach to Optimal Reinforcing Networks</i>	Dresden, Germany February 2024
Paris Shape Analysis Seminar <i>Talk: New Methods for the Space of Discrete Shells</i>	Paris, France November 2023
93rd GAMM Annual Meeting <i>Talk: Parametrizing Product Shape Manifolds by Composite Networks</i>	Dresden, Germany May 2023
11th International Conference on Learning Representations (ICLR 2023) <i>Talk: Parametrizing Product Shape Manifolds by Composite Networks</i> Spotlight Paper	Kigali, Rwanda May 2023
Workshop on Discrete Systems and Calculus of Variations <i>Talk: A Stochastic Bilevel Problem for Elastic Shape Optimization</i> Invited Junior Speaker	TU Munich, Germany November 2022
MFO Workshop on Mathematical Imaging and Surface Processing <i>Talk: Repulsive Shells</i>	Oberwolfach, Germany August 2022
Curves and Surfaces 2022 <i>Talk: A Phase-field Approach to Variational Hierarchical Surface Segmentation</i>	Arcachon, France June 2022
Workshop on Nonlinear Bending <i>Talk: Repulsive Discrete Shells</i>	Freiburg, Germany May 2022
SIAM Conference on Geometric and Physical Modeling (GD/SPM21) <i>Talk: A Pessimistic Bilevel Stochastic Problem for Elastic Shape Optimization</i>	Davis, CA, US (virtual) September 2021
31st European Conference on Operational Research (EURO 2021) <i>Talk: A Pessimistic Bilevel Problem for Elastic Shape Optimization under Stochastic Uncertainty</i>	Athens, Greece (virtual) July 2021
ALGORITHMY Conference on Scientific Computing <i>Talk: Nonlinear Deformation Synthesis via Sparse Principal Geodesic Analysis</i>	Vysoke Tatry, Slovakia (virtual) September 2020
Eurographics Symposium on Geometry Processing (SGP 2020) <i>Talk: Nonlinear Deformation Synthesis via Sparse Principal Geodesic Analysis</i>	Utrecht, NL (virtual) July 2020

SIAM Conference on Analysis of Partial Differential Equations (PD19) <i>Talk: Solving Variational Problems on Triangle Meshes using Nonlinear Rotation-Invariant Coordinates</i>	La Quinta, CA, US December 2019
Applied Geometry Research Seminar <i>Talk: Constructing Low-Dimensional Submanifolds in Nonlinear Rotation-Invariant Coordinates</i>	JKU Linz, Austria November 2019
15th NFN Seminar Geometry + Simulation <i>Talk: Geometric Optimization using Nonlinear Rotation-Invariant Coordinates</i>	Strobl, Austria October 2019
Sixth International Conference on Continuous Optimization (ICCOPT 2019) <i>Talk: Geometric Optimization using Nonlinear Rotation-Invariant Coordinates</i>	Berlin, Germany August 2019
Eurographics Symposium on Geometry Processing (SGP 2019) <i>Poster: Geometric Optimization using Nonlinear Rotation-Invariant Coordinates</i>	Milan, Italy July 2019
14th NFN Seminar Geometry + Simulation <i>Talk: Discrete Gauß–Codazzi Equations for Triangle Mesh Processing</i>	Strobl, Austria March 2019
Computer Graphics and Visualization Research Seminar <i>Talk: Variational Problems in the Space of Lengths and Angles</i>	TU Delft, Netherlands November 2018

Teaching Experience

Teaching Assistant	Lecture “Engineering Mathematics II”	Summer 2023
	Graduate seminar “Mathematical Analysis of Machine Learning Methods”	Summer 2021
	Lecture “Engineering Mathematics III”	Winter 2020/21
	Lecture “Engineering Mathematics I”	Winter 2019/20
	Graduate seminar “Modelling and Mathematical Analysis of Deep Learning Methods”	Summer 2019
	Lecture “Linear Algebra for Computer Scientists”	Summer 2016
	Lecture “Introduction to Algebra”	Winter 2015/16
	Lecture “Linear Algebra II”	Summer 2015
	Lecture “Linear Algebra I”	Winter 2014/15
Teaching of Repetition Class	Lecture “Linear Algebra II”	Summer 2014
Mentor	Mentor for Master’s theses of Kai Echelmeyer (Bonn, 2020), Janos Meny (Bonn, 2020), Yannick Kees (Bonn, 2022), and Florine Hartwig (Bonn, 2022).	
	Project leader at MIT’s Summer Geometry Institute 2021.	
	Mentor in the Young African Mathematicians – Bonn Visitor Program for Angelo Kitio (2022/23).	

Professional Service

Reviewer	Eurographics (2021), Graphical Models (2021), SIAM Journal on Imaging Sciences (2022–), Pattern Recognition (2023), TAC:PRA workshop @ CVPR (2023), ICCV (2023), ECCV (2024), CVPR (2025), Nonlinear Science (2025), ICIAP (2025), SIGGRAPH (2025), Transaction on Graphics (2025)	
Outreach	Exhibition “Mathematics in Computer Graphics” at Univ. Bonn Summerfestival 2019. Talk “How I Wrote My Master’s Thesis In Numerics” for Master’s students in Bonn 2020.	
Committees	At Univ. Bonn: Appointment committees, Board of the Mathematical Institute, Board of the Department of Mathematics	

Industry Experience

ABB

Corporate Research Intern

Investigated machine learning algorithms on physical measurement and image data in specific power distribution systems (medium-voltage switchgears). Using Python, I evaluated ideas on model- and data-driven classification of asset health.

Ladenburg

January 2018 – March 2018

Deloitte

Intern – Financial Advisory – Analytics

Worked on a client project on retail fraud detection, where I developed a comprehensive solution for the automatic creation of Excel reports for the client. This led to substantial time savings. Furthermore, I vastly improved the existing source code in Python & SQL and established Git as version control system.

Düsseldorf

September 2017 – November 2017

Voluntary Activities

Co-founder & Deputy Chairperson

Aim: raise awareness of the importance of vaccinating

Chairperson

Impfauklärung in Deutschland e.V.

December 2017 – December 2021

Student Association of Mathematics Bonn

January 2015 – July 2017