

# Josua Sassen | CURRICULUM VITÆ

ENS Paris-Saclay – 4 Avenue des Sciences – 91190 Gif-sur-Yvette – France  
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## Education

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### 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

## Research Experience

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### Centre Borelli

*MathInGreaterParis Postdoctoral Fellow*

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

**École normale supérieure Paris-Saclay**

since October 2023

### Institute for Numerical Simulation (INS)

*Research Assistant*

Working on geometry processing and numerical analysis projects; partially funded by FWF NFN S117, Project 5 – “Geodesic Paths in Shape Space” and CRC1060, Project C06 – “Numerical optimization of shape microstructures”

**University of Bonn**

May 2019 – September 2023

### Computer Science Department

*Research Visitor*

Visiting the group of Prof. Keenan Crane

**Carnegie Mellon University**

October 2021 – December 2021

### Collaborative Research Centre 1060 / INS

*Student Research Assistant*

Part of project C05 – “Discrete Riemannian calculus on shape space”, supervised by Prof. Dr. Martin Rumpf

**University of Bonn**

November 2018 – April 2019

### Fraunhofer SCAI

*Student Research Assistant*

Part of group “Numerical Data-Driven Prediction”, supervised by Prof. Dr. Jochen Garcke

**Sankt Augustin**

October 2016 – August 2017, April 2018 – March 2019

## Publications

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### Peer-Reviewed

1. 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.
2. 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](https://openreview.net/forum?id=F_EhNDSamN).
3. 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.
4. 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.1.2021.3826.

5. 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.
6. 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.
7. 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.....

8. Josua Sassen. "Riemannian Calculus and Shape Optimization on the Space of Discrete Surfaces". PhD thesis. University of Bonn, 2023. DOI: 20.500.11811/10960.
9. 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.
10. Josua Sassen. "Discrete Gauß–Codazzi Equations for Efficient Triangle Mesh Processing". Master's Thesis. University of Bonn, 2019.

## Awards & Honors

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### 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

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### 93rd GAMM Annual Meeting

Talk: *Parametrizing Product Shape Manifolds by Composite Networks*

Dresden, Germany

May 2023

### 11th International Conference on Learning Representations (ICLR 2023)

Talk: *Parametrizing Product Shape Manifolds by Composite Networks*

Kigali, Rwanda

May 2023

### Workshop on Discrete Systems and Calculus of Variations

Talk: *A Stochastic Bilevel Problem for Elastic Shape Optimization*

TU Munich, Germany

November 2022

### Curves and Surfaces 2022

Talk: *A Phase-field Approach to Variational Hierarchical Surface Segmentation*

Arcachon, France

June 2022

### SIAM Conference on Geometric and Physical Modeling (GD/SPM21)

Talk: *A Pessimistic Bilevel Stochastic Problem for Elastic Shape Optimization*

Davis, CA, US (virtual)

September 2021

### 31st European Conference on Operational Research (EURO 2021)

Talk: *A Pessimistic Bilevel Problem for Elastic Shape Optimization under Stochastic Uncertainty*

Athens, Greece (virtual)

July 2021

### ALGORITHMY Conference on Scientific Computing

Talk: *Nonlinear Deformation Synthesis via Sparse Principal Geodesic Analysis*

Vysoke Tatry, Slovakia (virtual)

September 2020

### Eurographics Symposium on Geometry Processing (SGP 2020)

Talk: *Nonlinear Deformation Synthesis via Sparse Principal Geodesic Analysis*

Utrecht, NL (virtual)

July 2020

<b>SIAM Conference on Analysis of Partial Differential Equations (PD19)</b> <i>Talk: Solving Variational Problems on Triangle Meshes using Nonlinear Rotation-Invariant Coordinates</i>	<b>La Quinta, CA, US</b> December 2019
<b>Applied Geometry Research Seminar</b> <i>Talk: Constructing low-dimensional submanifolds in nonlinear rotation-invariant coordinates</i>	<b>JKU Linz, Austria</b> November 2019
<b>15th NFN Seminar Geometry + Simulation</b> <i>Talk: Geometric optimization using nonlinear rotation-invariant coordinates</i>	<b>Strobl, Austria</b> October 2019
<b>Sixth International Conference on Continuous Optimization (ICCOPT 2019)</b> <i>Talk: Geometric optimization using nonlinear rotation-invariant coordinates</i>	<b>Berlin, Germany</b> August 2019
<b>Eurographics Symposium on Geometry Processing (SGP 2019)</b> <i>Poster: Geometric optimization using nonlinear rotation-invariant coordinates</i>	<b>Milan, Italy</b> July 2019
<b>14th NFN Seminar Geometry + Simulation</b> <i>Talk: Discrete Gauß–Codazzi equations for triangle mesh processing</i>	<b>Strobl, Austria</b> March 2019
<b>Computer Graphics and Visualization Research Seminar</b> <i>Talk: Variational problems in the space of lengths and angles</i>	<b>TU Delft, Netherlands</b> November 2018

## Teaching Experience

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<b>Teaching Assistant</b>	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
<b>Teaching of Repetition Class</b>	Lecture “Linear Algebra II”	Summer 2014

## Professional Service

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<b>Reviewer</b>	Eurographics (2021), Graphical Models (2021), SIAM Journal on Imaging Sciences (2022), Pattern Recognition (2023), TAG:PRA workshop @ CVPR (2023), ICCV (2023)	
<b>Mentor</b>	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).	
<b>Outreach</b>	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.	

## Industry Experience

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### **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

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### **Co-founder & Deputy Chairperson**

Aim: raise awareness of the importance of vaccinating

### **Chairperson**

### **Member of various University Committees**

Appointment committees, Board of the Mathematical Institute, Board of the Department of Mathematics

### **Impfauklärung in Deutschland e.V.**

*December 2017 – December 2021*

### **Student Association of Mathematics Bonn**

*January 2015 – July 2017*

### **Student Association of Mathematics Bonn**

*April 2014 – March 2019*