

Paul Louis Bendich

Curriculum Vitae

Department of Mathematics
Physics Building 210
Duke University
Durham, NC 27708-0320

bendich@math.duke.edu
www.paulbendich.com
Phone: (919) 660-2811
Fax: (919) 660-2821

Research Interests: Computational Topology and Geometry, Algebraic Topology, Manifold and Stratification Learning

Education

Duke University

Ph.D. in Mathematics
Duke University

Durham, NC

8/2003–8/2008
Durham, NC

M.A. in Mathematics
Grinnell College

8/2003–2/2005
Grinnell, IA

B.A. in Physics

8/1997–5/2001

Employment

- Visiting Assistant Professor, Department of Mathematics, Duke University, 1/2011– Present.
 - Postdoctoral Associate, IST Austria, 8/2009–12/2010.
 - Instructor, Department of Mathematics, Pennsylvania State University, 8/2008–7/2009.
 - Graduate Teaching Assistant, Department of Mathematics, Duke University, 8/2004–8/2008
-

Publications

1. Φ -SoMap: Intrinsic Distance for Dimension Reduction via Persistent Homology with Jacob Harer, submitted.
2. Homology and Robustness of Level and Interlevel Sets with Herbert Edelsbrunner, Dmitriy Morozov, and Amit Patel, to appear in Homology, Homotopy, and Applications.
3. Local Homology Transfer and Stratification Learning with Bei Wang and Sayan Mukherjee, to appear in Proc. 24th Sympos. on Discrete Algorithms.
4. A Point Calculus for Interlevel set Homology with Sergio Cabello and Herbert Edelsbrunner, to appear in Pattern Recognition Letters.
5. Improving Homology Estimates with Random Walks with Taras Galkovskiy and John Harer, Inverse Problems 27 (2011) 124002.
6. Persistent Intersection Homology with John Harer, Foundations of Computational Mathematics, 11 (2011), no. 3, 305-336.
7. Computing Robustness and Persistence for Images with Herbert Edelsbrunner and Michael Kerber IEEE Trans. Visual. and Comput. Graphics, 2010, pp. 1251-1260.
8. Persistent Homology under Non-Uniform Error with Herbert Edelsbrunner, Michael Kerber, and Amit Patel, Proc. 35th Internat. Sympos. on Math. Found. of Comput. Science, 2010, pp. 12-23.
9. The Robustness of Level Sets with Herbert Edelsbrunner, Dmitriy Morozov, and Amit Patel, Proc. 18th Europ. Sympos. Algorithms, 2010, pp. 1-10.
10. Analyzing Stratified Spaces Using Persistent Versions of Intersection and Local Homology, Ph.D. Thesis, Duke University, 2008.
11. Inferring Local Homology from Sampled Stratified Spaces with David Cohen-Steiner, Herbert Edelsbrunner, John Harer, and Dmitriy Morozov, Proc. 48th Sympos. on Found. of Comput. Science, 2007, pp. 536-546.

Courses Taught

- *The Emerging Science of Complex Data (First-Year Seminar)*, Duke, Spring 2012.
- *Topology*, Duke, Fall 2011.
- *Computational Topology*, IST Austria, Fall 2010.
- *Linear Algebra*, Penn State, Spring 2009.
- *Business Calculus II*, Penn State, Spring 2009.
- *Calculus I*, Penn State, Fall 2008.
- *Linear Algebra and Differential Equations*, Duke, Summers 2008 and 2007.
- *Laboratory Calculus II*, Duke, Summer 2006, Spring 2006.
- *Laboratory Calculus I*, Duke Fall 2005.

Departmental Service

- Coordinator, Research Training Grant (Structure in Complex Data), Duke, 1/2011–Present.
- Coordinator, Summer Undergraduate Research Program, Duke, 1/2011–Present.
- Organizer, Data Seminar, Duke, 8/2011–Present.
- Member and Founder, Graduate Student Calculus Curriculum Committee, Duke, Fall 2008.

Seminar and Conference Talks

- Φ -SoMap, AMS-MAA Joint Meetings, 1/2012.
- *Persistence Diagrams and the Information they Carry*, Data Seminar, Duke, 8/2011.
- *Stratification Learning via Local Homology Inference*, Invited Talk, INRIA-Saclay, 10/2010.
- *The 2-Point Formula*, CTIC, 10/2009.
- *Elevation on Stratified Spaces via Intersection Homology*, DARPA TDA meeting, 1/2009.
- *Teaching Without much Lecturing*, Education Seminar, Penn State, 1/2009.
- *Persistent Intersection Homology*, Algorithms Seminar, Duke, 3/2008.
- *Local Homology Vineyards*, DARPA TDA meeting, 1/2008.
- *Persistence*, Grad-Fac Seminar, Duke, 10/2007.
- *Persistent Local Homology*, DARPA TDA meeting, 5/2006.

Professional Service

- Reviewer for Symposium on Computational Geometry
- Reviewer for Symposium on Artificial Intelligence and Statistics
- Reviewer for Experimental Mathematics
- Reviewer for Foundations of Computational Mathematics
- Reviewer for Inverse Problems
- Reviewer for Discrete and Computational Geometry
- Reviewer for Revista Matemática Complutense