

Research Interests

Mathematics: Conformal Mapping, Geometric Analysis, Geometric Group Theory

Computer Science: Computer Networks, Image Processing, Machine Learning

Education:

1991 – 1994 Ph.D. Mathematics University of Illinois at Chicago

Employment:

1994 – 1996	H.C. Wang Assistant Professor	Cornell University
1996 – 1997	Postdoctoral Fellowship	MSRI-Mathematical Sciences Research Institute, Berkeley
1997 – 1999	Olga Taussky-John Todd Instructor	California Institute for Technology
2000 – 2002	Lecturer of Mathematics	Ben-Gurion University - Israel
2002 – 2005	Senior Lecturer of Mathematics	Ben-Gurion University - Israel
2005 – 2010	Associate Professor	University of Georgia
2010 –	Professor	University of Georgia

Individual Research Grants, Awards and Academic Recognition:

2017 – 2018 UGA Research-Intensive Study in a Second Discipline hosted by the Computer Science Department at UGA

2014 – 2019 A Simons Foundation Collaboration Grant

2013 – 2013 2013 – 2013 A Provost Research Summer Grant,

Publications & Work in progress See also the Papers section in [Website](#).

1. *Jorgensen's inequality for discrete groups in normed algebras*, with S. Friedland, Duke Math. J. **69** (1993), 593-614.
2. *Covolume estimates for discrete groups of hyperbolic isometries having parabolic elements*, Mich. Math. J., **40** (1993), 467-475.
3. *A generalization of the Shimizu-Leutbecher lemma and the Jorgensen inequality to Möbius transformations in R^n* , Proc. Amer. Math. Soc., **121** (1994), 209-215.
4. *On the volumes of complex hyperbolic manifolds*, with F. Paulin, Duke Math. J., **84** (1996), 719-737.
5. *Groups of automorphisms of trees and their limit sets*, with J.H. Hubbard, Ergodic Theory and Dynamical Systems, **17** (1997), 869-884.
6. *On the rigidity of discrete isometry groups of negatively curved spaces*, with F. Paulin, Comm. Math. Helv., **72** (1997), 349-388.
7. *On the Betti number of the smallest closed Hyperbolic 3-manifold*, with M. Culler and P.B. Shalen, Topology, **37** (1998), 805-849.
8. *Counting horoballs and rational geodesics*, with F. Paulin and K. Belabas, Bull of the London Mathematical Society, **33** (2001), 606-612.
9. *Hausdorff dimension of diophantine geodesics in negatively curved manifolds*, with F. Paulin, Journal für die reine und angewandte Mathematik, **539** (2001), 29-43.
10. *Diophantine approximation in negatively curved manifolds and in the Heisenberg group*, with F. Paulin, "Rigidity in dynamics and geometry (Cambridge, 2000)", M. Burger, A. Iozzi eds, Springer, Berlin (2002), 203-226.
11. *Diophantine approximations for negatively curved manifolds*, with F. Paulin, Mathematische Zeitschrift, **241** (2002), 181-226.
12. *Approximations by maximal cusps on the boundary of quasiconformal deformation space*, with R.D. Canary, M. Culler and P.B. Shalen, Journal of Differential Geometry, **64** (2003), 57-109.
13. *Counting orbit points in coverings of negatively curved manifolds and Hausdorff dimension of cusp excursions*, with F. Paulin, Ergodic Theory and Dynamical Systems, **24** (2004), 803-824.
14. *Ubiquity of geometric finiteness in boundaries of deformation spaces of hyperbolic 3 manifolds*, with R.D. Canary, American Journal of Mathematics, **126** (2004), 1193-1220.
15. *A logarithm law for automorphism groups of trees*, with F. Paulin, Archiv der Mathematik, **88** (2007), 97 –108.
16. *Energy and length in a topological planar quadrilateral*, Euro. J. of Combinatorics, **29** (2008), 208 – 217.
17. *On the almost sure spiraling of geodesics in negatively curved manifolds*, with F. Paulin, Journal of Differential Geometry, **85** (2010) 271–314.

18. *Boundary value problems on planar graphs and flat surfaces with conical singularities, II : The Dirichlet-Neumann problem*,
Differential Geometry and its Applications, **29** (2011) 329–347.
19. *The triple intersection property, three dimensional extremal length, and tiling of a topological cube*,
Topology and its Applications, **159** (2012), 2795–2805.
20. *Boundary value problems on planar graphs and flat surfaces with conical singularities, I: The Dirichlet problem*,
Journal für die reine und angewandte Mathematik, **670** (2012), 65–92.
21. *Discrete Harmonic Coordinates and Convergence to Conformal Maps, I: A Harmonic Conjugate*,
Commentarii Mathematici Helvetici, **90** (2015), 325–364.
22. *Addendum: the case of closed surfaces (to #20 Boundary Value Problems on Planar Graphs and Flat Surfaces with integer cone singularities, I: The Dirichlet problem)*,
Journal für die reine und angewandte Mathematik, **713** (2016), 247–250.
23. *A Novel Approach to the Approximation of Conformal Mappings and Emerging Applications to Shape Recognition of Planar-Domains*, With H.R. Arabnia and T.R. Taha,
Proceedings of the 2017 International Conference on Computational Science and Computational Intelligence, Publisher: IEEE CPS, Editors: Hamid R. Arabnia, Leonidas Deligiannidis, Fernando G. Tinetti, Quoc-Nam Tran, Mary Qu Yang, (2017), 532–534.
24. *Poincaré inequality on complete Riemannian manifolds with Ricci curvature bounded below*, with G. Besson and G. Courtois,
Mathematical Research Letters **25** (2018) 1741–1769.
25. *Approximation of conformal mappings and novel applications to shape recognition of planar domains*,
The Journal of Supercomputing, **74** (2018), 6333–6368.
26. *Singular level curves of harmonic functions, conformal mappings and emerging applications to shape recognition of planar-domains*, with E. Perkerson,
Proceedings of the International Conference on Image Processing, Computer Vision, and Pattern Recognition (IPCV), (2019), 85–88.
27. *Rigidity of flat holonomies*, with G. Besson and G. Courtois,
Ergodic Theory and Dynamical Systems **45** (2025), no. 4, 1048–1077.
See: [Papers](#)
28. *On Horospherical Rigidity*, with G. Besson and G. Courtois,
International Mathematics Research Notices IMRN (2025), no. 18, Paper No. rnaf267.
See: [Papers](#)
29. *Uniformization of an annulus via discretization of harmonic conjugate pair*, with E. Perkerson and an appendix by J.A. Konfrst,
Journal of Computational and Applied Mathematics **475** (2026), Paper No. 116976, 29 pp.
See: [Papers](#)
30. *Schottky pairs on trees via continued fractions and axial geometry*, with Yukun Du,
submitted for publication (November 2025).
See: [Papers](#)