Saar Hersonsky

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Areas of Research and Interest:

Mathematics: Conformal Geometry, Geometric Group Theory and Low dimensional Topology

Computer Science: Computer Networks, Image Science, Machine Learning and Data Science

Education:

1986 – 1989	B.Sc.	Mathematics	Technion, Israel Institute for Technology
1989 – 1991	Graduate study	Mathematics	Hebrew University, Israel
1991 – 1994	Ph.D.	Mathematics	University of Illinois at Chicago
2017 – 2019	M.S.	Computer Science	University of Georgia

Employment:

1994 – 1996	H.C. Wang Assistant Professor	Cornell University
1996 – 1997	Posdoctoral 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 – 2022 A Simons Foundation Collaboration Grant

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

Publications & Work in progress See also my *Papers* page 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. Bésson 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. Bésson and G. Courtois, submitted for publication (August 2023), the most recent version is #27 in here: papers

28. *Canonical conformal models for planar-domains by flat surfaces with conical singularities*, in preparation.

29. *An Effective Algorithm for computing uniformizing maps of planar domains*, with E. Perkerson, in preparation.

Professional Activities and Service:

Referee duties: Transactions of the American Mathematical Society, Proceedings of the American Mathematical Society, Duke Mathematical Journal, Israel Journal of Mathematics, Geometry & Topology, Topology and its Applications, Journal of Differential Geometry, Annals of Mathematics, Journal of Mathematical Analysis and Applications, Communication is Analysis and geometry, Journal of Supercomputing, Proceedings of the London Mathematical Society.

Service as a Research Mentor (UGA):

2016 – 2019 Dr. Hung Tran was a post-doctoral fellow

Service as a Teaching Mentor (UGA):

2019 – 2021 Dr. Nicholas Triantafillou was a Postdoctoral Research and Teaching Associate

2022 – Dr. Joshua Stucky is a Postdoctoral Research and Teaching Associate

Service for the Computer Science Department (UGA) :

2021 – 2022 Assistant & Associate Professor Tenure-Track Selection Hiring Committee in Computer-Vision

Service on task force (UGA):

2021 – 2022 Member of the UGA's NSF IUSE grant called DeLTA – A four year grant studying institutional change in the context of evidence based teaching practices in the STEM fields