Andrejs Eriks Treibergs   Curriculum Vitae   February 20, 2024

Professor   Birthdate: October 27, 1952
Department of Mathematics   U.S. Citizen
University of Utah   (801) 581-8350 (office)
155 South 1400 East, JWB 233   (801) 463-7028 (home)
Salt Lake City   email: treiberg@math.utah.edu
Utah 84112-0090

Field of Specialization:

                        Geometric Analysis / Differential Geometry

Education:

Aug. 1980	Ph.D. Mathematics, Stanford University, under Prof. S. T. Yau
Apr. 1976	M.S. Mathematics, Stanford University
June 1974	B. S. Mathematics, University of Minnesota, Minneapolis MN 55455

Work Experience:

Aug. 07 – Feb. 24	Professor, Department of Mathematics, University of Utah, Salt Lake City, UT 84112
Jan. 07 - July 07	Sabbatical from UU: Visiting Researcher, Dept. Mathematics, University of California, Irvine CA 92697
Sept. 06 - Dec. 06	Sabbatical from UU: Member, Mathematical Sciences Research Institute, Berkeley, CA, 94720-5070
Aug. 00 – July 06	Professor, Department of Mathematics, University of Utah, Salt Lake City, UT 84112
Jan. 00 - July 00	Sabbatical from UU: Visiting Researcher, Dept. Mathematics, University of California, Irvine CA 92697
Sept. 99 - Dec. 99	Sabbatical from UU: Department of Mathematics, University of Utah, Salt Lake City, UT 84112
July 93 - Apr. 99	Professor, Department of Mathematics, University of Utah, Salt Lake City, UT 84112
Sept. 92 - June 92	Sabbatical from UU: Visiting Professor, Dept. Mathematics, University of California, Irvine CA 92397
Jul. 91 - Aug. 92	Professor, Department of Mathematics, University of Utah, Salt Lake City, UT 84112
Aug. 86 - June 91	Associate Professor, Department of Mathematics, University of Utah, Salt Lake City, UT 84112
Mar. 86 - July. 86	Assistant Professor, Department of Mathematics, University of Chicago, Chicago, IL 60637
Jan. 86 - Mar. 86	Visiting Scholar – Department of Mathematics, University of California San Diego, and La Jolla
Sept. 85 - Dec. 85	Visiting Scholar, Department of Mathematics, University of Utah, Salt Lake City, UT 84112

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Jan. 85- Aug. 85	Assistant Professor, Department of Mathematics, University of Chicago, Chicago, IL 60637
Sept. 84 - Dec. 84	Visiting Assistant Professor, Department of Mathematics, Purdue University, West Lafayette, IN 47907
Oct. 83 - Aug. 84	Assistant Professor, Department of Mathematics, University of Chicago, Chicago, IL 60637
Sept. 82 - Sept. 83	Member, Mathematical Sciences Research Institute, Berkeley, CA 94720
Sept. 81 - Aug.82	Lecturer, Department of Mathematics, University of California, Berkeley CA 94720
Apr. 81 - Aug. 81	Visiting Lecturer – Department of Mathematics, University of California San Diego, La Jolla, CA 92093
Sept. 80 - Mar. 81	Lecturer, Department of Mathematics, University of California, Berkeley CA 94720
Mar 80 - June. 80	Teaching Assistant – Department of Mathematics, University of California San Diego, La Jolla, CA 92093
Sept. 79 - June 79	Teaching Assistant, Department of Mathematics, University of Pennsylvania, Philadelphia, PA 19104
Sept. 74-Apr. 80	Teaching Assistant, Department of Mathematics, Stanford University, Stanford, CA 94305
Sept. 71-July74	Undergraduate Teaching Assistant, Consultant, Reader, Department of Mathematics, University of Minnesota, Minneapolis, MN 55455
July 70-Aug. 74	Programmer, Industrial Relations Center, University of Minnesota, Minneapolis MN 55455

Ph.D. Students:

Dec. 2015	Predrag Krtolica, co/advisor with A. Cherkaev, University of Utah dissertation: Compatibility Conditions and Applications to Damage in Discrete Structures
Dec. 1997	Hsungrow Chan (National Ping-Tung Teacher's college, Taiwan), University of Utah dissertation: Nonexistence of isometric immersions of noncompact surfaces with nonpositive curvature

Awards:

Sept. 1985	Sloan Fellowship

Recent Grants:

July 93 - Dec. 95	National Science Foundation Grant, Prescribed curvature, harmonic maps and evolution problems, DMS-9307517
June 87 - Dec 90	National Science Foundation Grant, Analysis on manifolds (with P.Li) DMS 8700783

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Recent Professional Service

Oct. 2011	Coorganizer (with Lei Ni, UCSD and Brett Kotschwar, Arizona State) of the special session "Geometric evolution equations and related topics" at the regional AMS meeting at the University of Utah
April 2004	Coorganizer (with N. Korevaar, N. Smale & M. Bestvina) of the joint Pacific Northwest Geometry Seminar / Wasatch Topology Seminar at the University of Utah
April 2001	Coorganizer (with M. Kapovich and M. Bestvina) of the joint Pacific Northwest Geometry Seminar / Wasatch Topology Seminar at the University of Utah
May 1998	Coorganizer (with M. Kapovich and N. Smale) of the Pacific Northwest Geometry Seminar at the University of Utah
Nov. 95	Coorganizer (with L.F. Tam) of Special Session on Harmonic Maps, American Math. Soc. meeting in USC, Los Angeles
Apr.95	Coorganizer (with N. Korevaar and N. Smale) of the Pacific Northwest Geometry Seminar at the University of Utah
April 92	Coorganizer of the Pacific Northwest Geometry Seminar at the University of Utah

Selected Recent Departmental / College / University Committees

21 – 24	Five-Year Tenured Faculty Review and Untenured Faculty Review Committee (chair)
18 – 20	Five-Year Tenured Faculty Review and Untenured Faculty Review Committee (chair)
18 – 20	Retention, Promotion and Tenure Co-Chair
12 – 20	University of Utah Senate Faculty Review Standards Committee (formerly Univ. RPT Standards Committee)
13 – 17	Undergraduate Colloquium Committee
14 – 17	Faculty Senate
13 – 17	Chair, College of Science Curriculum and Articulation Committee
05 – 15	Course Coordinator for Math 3210 – 3220
13 – 14	Undergraduate Awards Committee
13 – 14	Graduate Committee
08 – 13	Departmental Director of Graduate Studies
08 – 09	Departmental Faculty Meeting Secretary
08 – 09	Chair, College of Science Academic Appeals Committee
08 – 11	College of Science Alumni Association Departmental Rep.
07 – 13	Rocky Mountain Mathematics Consortium Dept. Rep.
07 – 08	Faculty Senate
02 – 05	Faculty Senate
03 – 04	University Promotion and Tenure Advisory Committee
01 – 03	Undergraduate Awards Committee

4. Andrejs Treibergs VITA   Publications in Refereed Journals and Proceedings

1. Entire spacelike hypersurfaces of constant mean curvature in Minkowski Space. Invent. Math. 66, 39-56 (1982).
2. Entire spacelike hypersurfaces of constant mean curvature in Minkowski Space, in Seminar on Differential Geometry, S. T. Yau, ed., Annals of Math Studies 102, Princeton University Press, 229-238 (1982).
3. Pinching theorem for the first eigenvalue on positively curved four-manifolds. Invent. Math. 66, 35-38 (1982)/ joint with P. Li.
4. Embedded hyperspheres with prescribed mean curvature. J. Differential Geom. 18, 513-521 (1983) / joint with S. W. Wei.
5. Existence and convexity for hyperspheres of prescribed mean curvature. Ann. Scuola Norm. Sup. Pisa Classe di Science 2, 225-241 (1985).
6. Estimates of volume by the length of shortest closed geodesics on a convex hypersurface. Invent. Math.80,481-488(1985).
7. New examples of harmonic diffeomorphisms of the hyperbolic plane onto itself, Manuscripta Math. 62, 248-256 (1988) / joint with Hyeong In Choi.
8. Bounds on Hyperspheres with Prescribed Gaussian Curvature. Journal of Differential Geometry 31, 913-926 (1990).
9. Gauss map of spacelike constant mean curvature hypersurfaces of Minkowski space, J. Diff. Geom. 32, 775-817 (1990)/joint with Hyeong In Choi.
10. How to hear the volume of convex domains, Contemporary Mathematics 127, Geometry and Nonlinear partial Differential Equations, Proceedings of the AMS special session held at Fayetteville, mar. 23-24, 1990, pp. 109–118, American Math. Soc., ed. V. Oliker and A. Treibergs (1991)/joint with P. Li and S. T. Yau.
11. Constructing Harmonic Maps into the Hyperbolic Space, Proceedings of Symposia in Pure mathematics, 54 (1993) Part 1, /joint with Hyeong In Choi.
12. A reverse isoperimetric inequality, stability and extremal theorems for plane curves with bounded curvature, Rocky Mountain Journal of Mathematics, 25, No. 2, Spring 1995 /joint with Ralph Howard
13. Harmonic maps from the complex plane into surfaces with nonpositive curvature, Communications in analysis and Geometry, 3, Number 1, 85--114, 1995. , /joint with Zheng-Chao Han, Luen-Fai Tam and Tom Wan
14. Nonpositively curved surfaces in $\mathbf{R}^3$, J. Diff. Geom.,57 (2001) 389-407,/joint Hsungrow Chan
15. Geometric Constant Defining Shape Transitions of carbon Nanotubes under Pressure, Physical Review Letters, 92, (2004) 105501.1-4,/joint J. Zang, Y. Han, Feng Liu, Materials Science and Engineering, U. Utah.
16. A capture problem in Brownian motion and eigenvalues of spherical domains, Trans. Amer. Math. Soc. 361 (2009), 391-405. /joint J. Ratzkin.
17. A Payne-Weinberger eigenvalue estimate for wedge domains on spheres Proc. Amer. Math. Soc. 137 (2009), 2299-2309. , /joint J. Ratzkin.
18. Which electric fields are realizable in conducting materials?/joint Marc Briane and Graeme W. Milton, ESAIM: Mathematical Modelling and Numerical

Analysis 2013/89: Special Issue 2014: Multiscale Problems and Techniques, Archive http://arxiv.org/abs/1301.1613.
19. Compatibility Conditions for Discrete Planar Structures, International Journal of Solids and Structures 184 (Feb. 2020), 248-278. /joint A. Cherkaev & P. Krtoloca

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Other Papers

1. Entire spacelike hypersurfaces of constant mean curvature in Minkowski Space. Doctoral dissertation, Stanford University 1980.
2. Lecture on the Eells-Sampson Theorem on parabolic deformation of maps to harmonic maps. Preprint (1987).
3. The structure of the Gauss map of a hypersurfaces in Minkowski Space, Proceedings of the Summer '89 Symposium of Korea, Korean Science and Technology Federation, Seoul Korea, 3-5, (1989) / joint with Hyeong In Choi.
4. Applications of Eigenvalues to Geometry, in Contemporary Geometry: J.-Q. Zong Memorial Volume, ed. H. Wu, Plenum, 21-52 (1991) /joint with P. Li.
5. How solutions of the bistable equation tend to standing waves, preprint (1991), / joint with Roger Yinman Lui.
6. Constant mean curvature hypersurfaces of Minkowski space and related problems, Proceedings of the Korea Advanced Institute of Science and Technology Mathematics Workshop, vol. 6, Geometry and Analysis, 95–158(1991).
7. Hyperbolicity of constant mean curvature surfaces of Minkowski Space, /joint with Hyeong In Choi, to appear in the proceedings of the First Pacific Rim Conference in Geometric Analysis held in Hong Kong, December 1992, Au, Cheng, Chou, Wan, eds. International Press, Hong Kong 1993.
8. A nonlocal curvature evolution problem in the plane, submitted to Procedings of the National Center for Theoretical Sciences International Workshop, held at Hsinchu, Taiwan June 25--July 5, 2000.
9. An isometric embedding problem arising from general relativity, submitted to Procedings of the National Center for Theoretical Sciences International Workshop, held at Hsinchu, Taiwan June 25--July 5, 2000.
10. Instability in a buoyant chemical front driven by curvature, preprint (2001)
11. On the Compression of Elastic Tubes, preprint (2006)/joint with Feng Liu

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Teaching Experience. Courses taught within the last few years:

2024	S	3010-1	History of Mathematics
		5470-2	Chaos Theory
2023	F	5410-1	Ordinary Differential Equations
		6410-1	Ordinary Differential Equations
2023	S	1310-4	Engineering Calculus I
		3210-1	Foundations of Analysis I
2022	F	3010-1	History of Mathematics
		5410-1	Ordinary Differential Equations
2022	S	3210-2	Foundations of Analysis I
		5210-1	Introduction to Real Analysis
2021	F	3210-3	Foundations of Analysis I
		5410-1	Ordinary Differential Equations
2021	S	2270-2	Linear Algebra
		2270-4	Linear Algebra
2020	F	2270-2	Linear Algebra
		5410-1	Ordinary Differential Equations
2020	S	3210-2	Foundations of Analysis I
		3220-2	Foundations of Analysis II
2019	F	3220-2	Foundations of Analysis II
		6510-1	Differentiable Manifolds
2019	S	2210-4	Calculus III
		3210-2	Foundations of Analysis I
2018	F	2270-1	Linear Algebra
		6510-1	Differentiable Manifolds
2018	S	3010-1	Topics: History of Mathematics
		3220-2	Foundations of Analysis II

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2017	F	5410-1	Ordinary Differential Equations
		6410-1	Ordinary Differential Equations
2017	S	3000-1	Undergraduate Colloquium
		3210-2	Foundations of Analysis I
		5210-1	Real Analysis
2016	F	3000-1	Undergraduate Colloquium
		5440-1	Partial Differential Equations
		6410-1	Ordinary Differential Equations
2016	S	3000-1	Undergraduate Colloquium
		3080-1	Applied Statistics II
		5470-1	Chaos Theory
2015	F	1210-4	Calculus I
		2270-1	Linear Algebra
		3000-1	Undergraduate Colloquium
2015	S	3000-1	Undergraduate Colloquium
		3160-1	Applied Complex Variables
		3210-2	Foundations of Analysis I
2014	F	3000-1	Undergraduate Colloquium
		3210-1	Foundations of Analysis I
		5410-1	Ordinary Differential Equations
2014	S	3000-1	Undergraduate Colloquium
		3080-1	Applied Statistics II
		3210-2	Foundations of Analysis I
2013	F	3000-1	Undergraduate Colloquium
		3070-1	Applied Statistics I
		6410-1	Ordinary Differential Equations
		•	Mathematics TA Training Workshop
2013	S	3220-2	Foundations of Analysis II
		6960-14	GSAC Colloq
2012	F	3070-1	Applied Statistics I
		6410-1	Ordinary Differential Equations
		•	Mathematics TA Training Workshop
2012	S	6170-1	Riemannian Geometry
		6960-14	GSAC Colloq and ERD Seminar

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2011	F	3070-1	Applied Statistics I
		3210-3	Foundations of Analysis I
		•	Mathematics TA Training Workshop

| 2011 | S | 2200-2 | Discrete Mathematics |
| | | 6960-14 | GSAC Colloq and ERD Seminar |

2010	F	3070-1	Applied Statistics I
		6410-1	Ordinary Differential Equations
		•	Mathematics TA Training Workshop

| 2010 | S | 3080-1 | Applied Statistics II |
| | | 6960-14 | GSAC Colloq and ERD Seminar |

2009	F	3210-1	Foundations of Analysis I
		6410-1	Ordinary Differential Equations
		•	Mathematics TA Workshop

| 2009 | S | 5010-1 | Introduction to Probability |

| 2008 | F | 3210-1 | Foundations of Analysis I |
| | | 6410-1 | Ordinary Differential Equations |

| 2008 | S | 3070-1 | Applied Statistics I |
| | | 4530-1 | Euclidean Curves and Surfaces |

| 2007 | F | 3220-1 | Foundations of Analysis II |
| | | 6170-1 | Riemannian Geometry |

| 2006 | S | 2160-1 | Introduction to Scientific Computing using C |
| | | 3160-1 | Complex Variables for Engineers |

| 2005 | F | 2280-1 | Introduction to Differential Equations |
| | | 6170-1 | Riemannian Geometry |

| 2005 | S | 3210-1 | Foundations of Analysis II |
| | | 3080-1 | Applied Statistics II |

| 2004 | F | 3210-2 | Foundations of Analysis I |
| | | 3070-1 | Applied Statistics I |

9. Andrejs Treibergs VITA

1998	F(semester)	2210	Calculus III
		2270	Linear algebra with MAPLE
1998	S	653	Geometry / Topology
1998	W	652	Geometry / Topology
		354	Complex Variables
1997	F	651	Geometry / Topology
		128	Precalculus for Business
1997	S	643	Differential Equations
		719	Topics (Geometric Analysis)
1997	W	642	Differential Equations
1996	F	641	Differential Equations
		223	Differential Equations
1996	S	553	Curves and Surfaces
1996	W	522	Real variables
		222	Advanced calculus
1995	F	521	Real variables
		221	Linear algebra
1993	W	213	Calculus (at UCI)
1992	S	653	Geometry/Topology
1992	W	652	Geometry/Topology
		353	PDE
1990	W	111	Calculus
		326	Adv. calc. – Integration
1989	F	113	Calculus
		323	Adv. calc. ODE-PDE

10.   Biographic Statement, Andrejs Treibergs

Andrejs Treibergs, Professor of Mathematics at the University of Utah, is interested in geometric analysis. Recently Treibergs has studied various applications of geometric analysis to applied mathematics. He has been interested in geometric problems, which occur in physics and engineering. With A. Cherkaev and P. Krtolica, he wrote about compatibility conditions for discrete structures. These are conditions for the solvability of the prescribed length equations and their linearization for networks. He related these to continuum compatibility for elasticity and linearized elasticity equations. In Riemannian Geometry, these are integrability conditions for prescribing a metric isometric to Euclidean space (vanishing of Riemannian curvature) and its linearization.   With Briane and Milton, he studied which electric fields are realizable. The solution boils down to analyzing solutions of a first order PDE.

Treibergs has written papers and remains interested in harmonic maps, prescribed mean and Gauss curvature, eigenvalues of the Laplacian, geodesics, isoperimetric inequalities and isometric embedding problems. He has recently become interested in curvature evolution problems that arise from applications as well as Ricci flow solution of the Geometrization Conjecture. Treibergs last sabbatical was Fall 06 at MSRI, where he participated in the special year on geometric evolution equations.

Together with J. Ratzkin, he resolved the missing case of a conjecture of Bramson and Griffeath about random pursuit that has been open twenty years. They have shown that if four predators chase one prey that has a head start on the real line, each doing independent standard Brownian motion, then the expected capture time is finite. In a second paper, they have found a conceptual argument for the eigenvalue estimates of the previous paper and generalized an estimate of Payne and Weinberger to spherical domains. Ratzkin has begun extending this to higher dimensions. A second interest is the question from general relativity involving the realization of wormhole spaces. Treibergs, together with his former Ph. D. student H. Chan have generalized Chan's result that assuming square integrable second fundamental form and embeddedness of the end, that there are no isometric immersions of a slice of Misner's wormhole initial data into Euclidean space. They show that any one-ended nonpositively curved surface embedded in Euclidean three space in this manner must lie between two parallel planes. Chan and Treibergs have investigated the infinitesimal rigidity of complete noncompact nonpositively curved surfaces of Euclidean space.

Treibergs benefited in his his spring 2007 sabbatical visiting the Department of Mathematics, University of California, Irvine, with Peter Li and visitor S.T.Yau. He proved the stability of flow in J. Zhu's model of a moving interface between two reacting chemicals in a gravitational field in the regime when combustion dominates. The curve evolves by combustion driven curvature flow plus a nonlocal hydrostatic boundary integral.