Ralph Elwood Howard

Department of Mathematics
University of South Carolina
Columbia, South Carolina 29208
howard@math.sc.edu
(803)-777-2913 (office)
(803)-799-8401 (home)

Date/Place of Birth:
25 December 1950
Glendale, California

Citizenship:
United States of America

Education

Ph.D	California Institute of Technology	1977–1982
M.S.	California State University, Northridge	1973–1974
B.A.	California State University, Northridge	1970–1973

Professional Experience

Professor, University of South Carolina	1999–Present
Associate Professor, University of South Carolina	1988–1999
Assistant Professor, University of South Carolina	1984–1988
Research Associate, Michigan State University	1982–1984
Visiting Assistant Professor, Duke University	Fall 1987
Visiting Associate Professor, Royal Institute of Technology, Stockholm	Fall 1993& Spring 1994

Grant Support

1986	NSF Summer Support (though Department of Engineering) Michael A. Sutton, principal investor
1986	University of South Carolina Research and Productive Scholarship Grant
1988–1990	NSF Summer Support, Joint grant with Marek Kossowski
1992	Summer Support on EPSCoR grant
1994–1998	Summer Support on DEPSCoR grants, Björn Jawerth, principal investor
1999–2000	Summer Support on DEPSCoR grants, Ron DeVore, principal investor

Colloquium and Seminar Talks

University of South Carolina	1982
Eastern Michigan State University	1984
Michigan State University	1984
University of Rochester (2 Talks)	1985
University of Oklahoma (2 Talks)	1985
University of Missouri	1986
University of North Carolina	1988
Emory University (2 Talks)	1988
Benedict College	1988
Saint Olaf College	1989
University of Minnesota	1989
University of Massachusetts, Amherst	1990
University of South Carolina, Aiken	1991
University of Utah	1992
Utah State University	1992
Dynamics Seminar Royal Institute of Technology, Stockholm	1993
Analysis Seminar Royal Institute of Technology, Stockholm	1993
Analysis Seminar University of Uppsala, Sweden	1994
Physics Seminar University of Stockholm	1994
University of Tennessee, Knoxville	1994
University of Miami	1995

Physics Department University of South Carolina	1996
University of Miami (2 Talks)	1997
South Carolina State University	1999
University of Georgia	1999
University of Georgia	2001
University of Georgia	2002

Talks at Conferences

Brunswick, Maine	1984	Los Angles, California	1985
San Antonio, Texas	1987	Salt Lake City, Utah	1987
Waterloo, Ontario Canada	1987	Chapel Hill, North Carolina	1989
Corvallis, Oregon	1989	San Francisco, California	1991
Bethlehem, Pennsylvania	1992	Athens, Georgia	1992
Athens, Georgia	1994	Orlando, Florida	1996
Columbia, Missouri	1996	Memphis Tennessee	1997
Athens, Georgia	1998	Athens, Georgia	1999
Lowell, Massachusetts	2000	Wichita, Kansas	2001*
Pisa, Italy	2002	Boston, Massachusetts	2002
Baltimore, Maryland	2003	Charleston, South Carolina	2003
Columbia, Missouri	2003	Lawrenceville, New Jersey	2004
Snowbird, Utah	2004	Wuhan, China	2004*

(∗ Plenary talk.)

Graduate Students

MASTER'S STUDENTS:

1990	Somasundaram Velummylum	*The Calculus of Variations and Zoll Surfaces*
1991	Louis Kenneth Reintz	*The Periodic Symmetry Groups of the Plane*
1991	Gary Allen Cohen	*Intersection Theory*
1999	Aseem Raval	*Mathematics Related to Spinning Tops*
2001	Michael S. Venn	*Analysis on Finite Gel'fand Spaces*
2004	Annamaria Rusu	*Reflection Groups*

PH.D. STUDENTS:

1991	Shiying Zhao*	*On the Boundary Behavior of Subharmonic Functions in Nontangential Acessible Domains*

(∗ Supervised jointly with Manfred Stoll.)

Reviewing for Journals

Journal	Number of Manuscripts
American Journal of Mathematics.	1
American Mathematical Monthly	2
Annals of Mathematics	1
Australian Mathematical Society. Journal.	1
Contemporary Mathematics.	1
The Bulletin of the London Mathematical Society	1
Discrete and Computational Geometry	2
Illinois Journal of Mathematics	1
Manuscripta Mathematica	1
Journal of Mathematical Physics	1
Proceedings of the American Mathematical Society.	2
The Rocky Mountain Journal of Mathematics	1
Transactions of the American Mathematical Society	1
Tsukuba Journal of Mathematics	2

Reviewing of Grants

Agency	Number of Proposals
National Science Foundation	13
USC Research and Productive Scholarship Awards Program	4
Idaho Board of Education	1

Conferences Organized

Organized and ran **Seventh Annual Southeast Geometry Conference** which took place at the University of South Carolina May 17 and May 18 of 1996. There were about 25 participants with 13 speakers. Some of the schools represented by speakers where THE ROYAL INSTITUTE OF TECHNOLOGY (STOCKHOLM), THE UNIVERSITY OF PENNSYLVANIA, THE UNIVERSITY OF ROCHESTER, DUKE UNIVERSITY, THE UNIVERSITY OF MIAMI, THE UNIVERSITY OF GEORGIA.

Co-organizer, with Mohammad Ghomi, of a special session, **Geometry of Curves and Surfaces**, at the 2001 Spring Southeastern Section Meeting of the American Mathematical Society. This special session doubled as the **Twelfth Annual Southeast Geometry Conference** co-organized along with Joe Fu.

On the organizing committee for **Fifteenth Spring Southeast Geometry Conference** held March 19–21 at the University of Georgia in Athens, GA.

Books or Monographs

1. *The kinematic formula in Riemannian homogeneous spaces*, Memoirs of the Amer. Math. Soc. Volume 109 Number 509 (1993)

Publications

1. *Dimension inequalities on the range of a multilinear function with vector space range*, Linear and Multilinear Algebra **8** (1978–1980) pp. 247–252
2. *Linear maps that preserve matrices annihilated by a polynomial*, Linear Algebra Appl. **30** (1980) pp. 167–176
3. *The nonexistence of stable submanifolds, verifolds, and harmonic maps in sufficiently pinched simply connected Riemannian manifolds*, Michigan Math. J. **32** (1985) pp. 321–334
4. (with S. W. Wei) *Inequalities relating sectional curvatures of a submanifold to the size of its second fundamental form and applications to pinching theorems for submanifolds*, Proc. Amer. Math. Soc. **94** (1985) pp. 699–702
5. (with S. W. Wei) *Nonexistence of stable harmonic maps to and from certain homogeneous spaces and submanifolds of Euclidean space*, Trans. Amer. Math. Soc. **294** (1986) pp. 319–331
6. *On the Gehrig link problem and the isoperimetric inequality of Bombieri and Simon*, J. Analyse Math. **47** (1986) pp. 243–253
7. (with J. C. Bezdek, R.J. Hathaway, C. A. Wilson) *Coordinate descent and clustering*, Control and Cybernet **15** (1986) pp. 195–204
8. *Classical integral geometry in Riemannian homogeneous spaces*, Contemporary Mathematics **63** (1987) pp. 179–203
9. (with J. C. Bezdek, R.J. Hathaway, C. A. Wilson, M. P. Windham) *Local convergence analysis of a grouped variable version of coordinate decent*, J. Optim. Theory Appl. **54** (1987) pp. 471–477
10. *A note on Roe's characterization of the sine function*, Proc. Amer. Math. Soc. **105** (1989) pp. 658–663
11. (with R. A. DeVore, C. Micchelli) *Optimal nonlinear approximation*, Manuscripta Math. **63** (1989) pp. 469–478
12. (with P. R. Goodey) *Processes of flats induced by higher dimensional processes*, Advances in Math. **80** (1990) pp. 92–109
13. (with A. R. Schep) *Norms of positive operators on L^p-spaces*, Proc. Amer. Math. Soc. **109** (1990) pp. 135–146

14. (with P. R. Goodey) *Processes of flats induced by higher-dimensional flats II*, Contemporary Mathematics **113** (1990) pp. 111–119

15. (with M. A. Sutton, J. R. Dickerson, S. R. McNeill) *A constrained, least squares approach for hybrid stress analysis of elastic bodies*, Engineering Analysis with Boundary Elements **8** (1991)

16. (with M. L. Reese) *Characterization of eigenfunctions by boundedness conditions*, Canadian Mathematical Bulletin **35** (1992) pp. 204–213

17. (with A. Treibergs) *A reverse isoperimetric inequality, stability and extremal theorems for plane curves with bounded curvature*, Rocky Mountain Jour. Math., **25** (1995), 635–684.

18. (with P. R. Goodey and M. Reeder) *Processes of Flats Induced by Higher Dimensional Process III*, Geom. Dedicata, **61** pp. 257–269, (1996)

19. (with L. Andersson and M. Dahl) *Boundary and Lens Rigidity of Lorentzian Surfaces*, Trans. Amer. Math. Soc., **348** pp. 2307–2329 (1996)

20. (with Paul Sisson) *Capturing the Origin with Random Points: Generalizations of a Putnam Problem*, College Math. Jour., **27** (1996) pp. 186–192

21. *The Sharp Sobolev Inequality and the Banchoff-Pohl Inequality on Surfaces*, Proc. of the Amer. Math. Soc. **126** (1998) pp. 2779–2787.

22. (with Lars Andersson and Greg Galloway) *A Strong Maximum Principle for Weak Solutions of Quasi-Linear Elliptic Equations with Applications to Lorentzian and Riemannian Geometry*, Comm. Pure Appl. Math., **51** (1998) pp. 581–624.

23. (with Lars Andersson and Greg Galloway) *The Cosmological Time Function*, Classical and Quantum Gravity **15** (1998) pp. 309–322

24. (With Lars Andersson) *Comparison and rigidity theorems in semi-Riemannian geometry*, Comm. in Analysis and Geometry **6** (1998) pp. 819–877.

25. (With S. J. Dilworth and J. W. Roberts) *Extremal Approximately Convex Functions and Estimating the Size of Convex Hulls*, Advances in Mathematics **148** (1999) pp. 1–43.

26. *Blaschke's Rolling Theorem for Manifolds with Boundary*, Manuscripta Mathematica, **99** (1999) pp. 471–483.

27. (with Piotr T. Chrusciel, Erwann Delay, and Greg Galloway) *Regularity of Horizons and the Area Theorem*, Annales Henri Poincaré **2** (2001) pp. 109–178.

28. (with Emil Cornea and Per-Gunnar Martinsson) *Solutions Near Singular Points to the Eikonal and Related First Order Non-linear Partial Differential Equations in Two Independent Variables*, Differential and Integral Equations, **14** (2001) pp. 1441–1468.

29. (With S. J. Dilworth and James W. Roberts) *On the Size of Approximately Convex Sets in Normed Spaces*, Studia Mathematica **140** (2000) pp. 213–241.

30. (with S. J. Dilworth and James W. Roberts) *Extremal Approximately Convex Functions and the Best Constants in a Theorem of Hyers and Ulam*, Advances in Mathematics **172** (2002) pp. 1–14.

31. (with P. T. Chrusciel, J. Fu, and G. Galloway) *On Fine Differentiability Properties of Horizons and Applications to Riemannian Geometry*, Journal of Geometry and Physics **41** (2002) pp. 1–12.

32. (with S. J. Dilworth and J. W. Roberts) *A General Theory of Almost Convex Functions*, To APPEAR IN in Trans. Amer. Math. Soc. (40 pages)

33. (With G. Károlyi and L. A. Szákely) *Towards a Katona Type Proof for the 2-Intersecting Erdös-Ko-Rado Theorem*, Electronic Journal of Combinatorics **8** (2001) R31 (8 pages)

34. (with A. Abrams, J. Cantarella, J. Fu, and M. Ghomi) *Circles Minimize most Knot Energies*, Topology **42** (2003) pp. 381–394.

35. *Constructing Complete Projectively Flat Connections*, To APPEAR IN Rocky Mountain Journal of Mathematics. (11 pages)

36. (with Wenxiong Chen, Erwin Lutwak, Deane Yang, and Gaoyong Zhang) *A Generalized Affine Isoperimetric Inequality*, To APPEAR IN Journal of Geometric Analysis. (17 pages)

37. *Convex Bodies of Constant Width and Constant Brightness*, SUBMITTED.

38. (with Daniel Hug) *Smooth Convex Bodies with Proportional Projection Functions*, SUBMITTED.