

CURRICULUM VITAE

John McCuan

School of Mathematics
Georgia Institute of Technology
Atlanta, GA 30332-0160
mccuan@math.gatech.edu

Education:

1995 Ph.D. Stanford University. Thesis Adviser: Robert Finn
1989 B.S. University of Alabama at Birmingham

Employment and Visiting Positions:

1999-present Assistant Professor, Georgia Institute of Technology
2004 Visiting Faculty, University of Georgia (Fall Semester)
2003 Visiting Scholar, Max Planck Institute for Mathematics in the Physical Sciences,
Leipzig
2001 CMI/MSRI Summer School on the Global Theory of Minimal Surfaces
1999 Visiting Scholar, Max Planck Institute for Mathematics in the Physical Sciences,
Leipzig
1996-99 NSF Postdoctoral Fellow, UC Berkeley and MSRI
1996 Visiting Scholar, University of Leipzig
1995-96 Postdoctoral Fellow, MSRI

Teaching:

1999-present Georgia Institute of Technology
(webpages www.math.gatech.edu/~mccuan/courses/archive)

Semester	Course No.	Course Title
Fall 2004	Math 8770	Partial Differential Equations I
Spring 2004	Math 1502	Calculus II
	Math 6023	Topology of Euclidean Spaces
Fall 2003	Math 7581	Calculus of Variations
	Math 4801	Math. of Physical Systems Seminar
Spring 2003	Math 6455	Differential Geometry
	Math 4801	Math. of Physical Systems Seminar
Fall 2002	Math 2413	Honors Ordinary Differential Eqns.
	Math 6514	Industrial Mathematics
	Math 4801	Math. of Physical Systems Seminar
Spring 2002	Math 6342	Partial Differential Equations II
	Math 4801	Undergraduate Special Topics
Fall 2001	Math 1502	Calculus II
	Math 2413	Honors Ordinary Differential Eqns.
Spring 2001	Math 8803	Geom. Measure Theory and PDE
Fall 2000	Math 2401	Calculus III
	Math 2413	Honors Ordinary Differential Eqns.
Spring 2000	Math 2401	Calculus III
	Math 4441	Differential Geometry

Georgia Tech Class of 1969 Teaching Fellow 2002-03

1997-1999 University of California, Berkeley
Courses: Differential Eqns., Algebraic Topology, Math. Methods in the Physical Sciences

ACE Lab

Co-founder, with John Pelesko in 2001, of an applied mathematics laboratory at Georgia Tech. The lab provides facilities for fundamental research and instruction involving physical experiments and demonstrations. See <http://www.ace.gatech.edu/>.

Publications and Research:

1. On toroidal rotating drops, with R. Hynd, accepted subject to revision by Pacific J. Math. (2004), available from www.math.gatech.edu/~mccuan/papers/gulliver/tori.pdf
2. Scherk-type capillary graphs, with R. Huff, to appear in J. Math. Fluid Mech. (2003), available from www.math.gatech.edu/~mccuan/papers/scherk/scherk2.pdf
3. Constructing convex solutions via Perron's method, with M. Feldman, to appear in Ann. Univ. Ferrara Sez. VII (N.S.) (2003), available from www.math.gatech.edu/~mccuan/papers/Perron/perron.pdf
4. Positively curved surfaces with no tangent support plane and minimal generating set, Proceedings of the American Mathematical Society **133**(1), 263–273 (2005).
5. Embedded minimal ends asymptotic to the helicoid, with D. Hoffman, Comm. Anal. Geom. **11**(4), 721–735 (2003).
6. Symmetry and symmetry breaking in electrostatic MEMS, with D. Bernstein and J. Pelesko, Proceedings of MSM 2003, San Francisco, CA, 304–307 (2003).
7. A generalized height estimate for H -graphs, Serrin's corner lemma, and applications to a conjecture of Rosenberg, in *Minimal Surfaces, Geometric Analysis and Symplectic Geometry*, Advanced Studies in Pure Mathematics **34**, AMS, 201–217 (2002).
8. Concavity, quasiconcavity, and quasilinear elliptic equations, Taiwanese Journal of Mathematics **6**, 157–174 (2002).
9. Liquid bridges, edge blobs and Scherk type capillary surfaces, with P. Concus and R. Finn, Ind. Univ. Math. J. **50**, no. 1, 411–441 (2001).
10. Symmetry via spherical reflection, J. Geometric Analysis **10**, no. 3, 545–564 (2000).
11. Vertex theorems for capillary drops on support planes, with R. Finn, Math. Nach., **209**, 115–135 (2000).
12. Continua of H -graphs: convexity and isoperimetric stability, Calc. Var. Partial Differential Equations **9**, 297–325 (1999).
13. Symmetry via spherical reflection and spanning drops in a wedge, Pacific J. Math. **180**, No. 2, 291–323 (1997).

Non-refereed/Contributed Publications:

14. Corning: Inverse problems for glass, with A. A. Lacey, et al., Sixteenth Annual Workshop on Mathematical Problems in Industry Proceedings, Newark, DE, June 2000 (2002).
15. Scaling laws for rotating fluid shapes, with P. Neshleba and R. Torii, in Proc. 7th Marcel Grossman Meeting, 1994, R. Jantzen and M. Keiser, eds., World Scientific (1997).

In Preparation:

16. Symmetry for coupled systems of elliptic equations and G. I. Taylor's deflected soap films, with J. Pelesko.
17. Plateau's rotating drops and rotational figures of equilibrium, with J. Elms, R. Hynd, and R. Lopez.
Draft available from www.math.gatech.edu/~mccuan/papers/plateau/plateau.pdf

18. A characterization of constant mean curvature surfaces with natural symmetry in \mathbb{S}^3 , with R. Hynd and S. Park
Draft available from www.math.gatech.edu/~mccuan/draft/clifford/clifford2.pdf
19. Minimal graphs over the annular domain between two convex curves with a jump discontinuity on the inner boundary component, with R. Huff

Selected Preprints:

20. Rotations of the three-sphere and symmetry of the Clifford torus,” with Lafe Spietz, (1998), MSRI Preprint 1998-052.
21. Retardation of Plateau-Rayleigh instability: A distinguishing characteristic among perfectly wetting fluids, (1997), MSRI Preprint 1997-011.

Graduate Students Supervised:

Ryan Hynd (Masters Thesis, Georgia Tech)

Undergraduate Students Supervised:

Jeffrey Elms (Georgia Tech)

Ryan Hynd (Georgia Tech)

Roberto Lopez (Georgia Tech)

Lafe Spietz (University of California, Berkeley)

Patrick Neschleba (Stanford University)

Postdoctoral Researchers:

Sungho Park (Seoul National University)

Tomasso Pacini (MIT)

Recent Collaborators:

Paul Concus (Lawrence Berkeley National Lab)

Mikhail Feldman (University of Wisconsin)

Robert Finn (Stanford University)

David Hoffman (MSRI)

Robert Huff (Indiana University)

John Pelesko (Georgia Tech).

Funding:

DMS-0103848 Collaborative Research: Capillary Interfaces, with P. Concus and R. Finn (08/15/01 - 07/31/05), \$149,687

Class of 1969 Teaching Fellow Award (2002), \$1000

Tech Fee Award for ACE Lab, with J. Pelesko (2002), \$35,000

Under Review:

DMS 0447517 CAREER: Geometric Interface Analysis, \$831,260

DMS 0443155: Southeast Geometry Seminar 2005-2007, \$16,500

Service:

- 2004 Southeast Geometry Seminar (Organizer with V. Oliker, G. Weinstein, S. Yamada), Postdoctoral Researchers Geometry Seminar, Colloquium Committee, Stelson Lecture Organizer, Elections Committee
- 2002-3 Georgia Tech Freshman Experience Faculty Mentor
Southeast Geometry Seminar (Organizer with A. Freire, G. Weinstein, S. Yamada)
- 2002 AMS Special Session, Three Bridges from Applied to Mathematics, Atlanta, GA (Organizer with J. Pelesko of sessions on Minimal Surfaces and MEMS)
- 2001-03 Colloquium Committee, Stelson Lecture Committee, Faculty Advisory Committee
- 2001-02 Colloquium Chair
- 2001 AMS Special Session, Variational Problems for Free Surface Interfaces, Chattanooga, TN (Organizer with T. Vogel and H. Wente)
- 2000-01 Stelson Lecture Committee
- 1999-00 Georgia Tech Geometry Seminar Organizer

Selected Invited Lectures

- 2004 University of Leipzig analysis seminar (July)
Symmetric minimal surfaces in the three-sphere
- 2004 2004 Summer School on Minimal Surfaces and Variational Problems, Jussieu (Paris) France (July)
Symmetric minimal surfaces in the three-sphere
- 2004 AIMS' Fifth International Conference on Dynamical Systems and Differential Equations, Pomona, CA (June)
On a new characterization of the Clifford Torus
- 2004 Nonlinear Science Seminar Georgia Tech (April)
The shape of rotating drops
- 2004 Southeast Geometry Conference (March)
Constructing convex solutions: Using Jensen's distance convolution
- 2003 University of Delaware Colloquium (November)
Regularity questions for capillary surfaces
- 2003 Oberwolfach, Partial Differential Equations Meeting (August)
Constructing convex solutions via Perron's method
- 2003 Summer School in Capillarity, MPI Leipzig (August)
On some questions of Gulliver on toroidal rotating drops
- 2003 Oberseminar Geometric Analysis, University of Cologne (July)
Concavity, quasi-concavity, and quasi-linear equations
- 2003 Summer School in Capillarity, MPI Leipzig (July)
Scherk type capillary graphs with a jump discontinuity
- 2003 Geometry Seminar, University of Granada, Spain (June)
Scherk type capillary graphs with a jump discontinuity
- 2003 Analysis Seminar, Emory University (March)
Constructing convex solutions via Perron's method
- 2003 Image Analysis Seminar, Georgia State University (March)
Positively curved surfaces with no tangent support plane
- 2003 Wichita State University, Lecture Series in the Mathematical Sciences (March)
Regularity of capillary graphs with corners

- 2002 University of Wisconsin, PDE Seminar (October)
Pseudo-regularity of convex subsolutions
- 2002 University of Minnesota, Geometry Seminar (September)
Pseudo-regularity of convex subsolutions
- 2002 Southeast Geometry Conference, University of Georgia (April)
Symmetry for solutions of a system of elliptic equations
- 2002 University of Toledo, Colloquium (April)
Positively curved surfaces with no tangent support plane
- 2002 Geometry Seminar, University of Tennessee, Knoxville (April)
Positively curved surfaces with no tangent support plane
- 2002 CDSNS Colloquium, Georgia Institute of Technology (February)
Positively curved surfaces with no tangent support plane
- 2002 University of Georgia Geometry/Analysis Seminar
Constructing convex solutions via Perron's method
- 2001 MSRI/CMI Summer School on the Global Theory of Minimal Surfaces (July)
Introduction to differential geometry and minimal surfaces (3 one-hour lectures)
Singular capillary graphs
- 2000 Nonlinear Analysis 2000, Courant Institute (May)
Quasi-concavity for quasilinear elliptic equations (poster session)
- 2000 Dixieland Analysis Seminar, Emory University
Corner comparison theorems
- 2000 Colloquium, Wesleyan University (October)
Convexity and quasiconvexity for solutions of elliptic PDE
- 1999 Oberseminar, University of Bonn
Convex viscosity solutions and a conjecture of Feldman
- 1999 Geometry Seminar, MPI Leipzig (two hour lecture)
Concavity and quasiconcavity for constant mean curvature surfaces
- 1999 Analysis Seminar, University of Leipzig
Quasiconcavity maximum principles
- 1999 Mathematics Awareness Month Lecture, University of Alaska
Convexity questions in capillarity
- 1999 Japanese American Mathematics Institute, Johns Hopkins
A generalized height estimate for H -graphs, Serrin's corner lemma and a conjecture of Rosenberg
- 1999 Pacific Northwest Geometry Seminar, University of Washington
Isoperimetric flow and convexity of H -graphs
- 1998 Outreach Program for Middle School, MSRI
Soap bubbles and soap films
- 1997 Outreach Program for High School, MSRI
Minimal surfaces and soap films
- 1997 International Conference on Differential Equations and Dynamic Systems, University of Waterloo, Waterloo, Canada
Liquids bridging planes
- 1996 Mathematics Seminar, Lucent Technology
Spherical reflection of constant mean curvature surfaces

- 1996 International Conference in Differential Geometry, Rio de Janeiro
Spherical reflection of constant mean curvature surfaces
- 1996 Institute f. Math., Univ.Potsdam, Germany (Max-Planck-Gesellschaft, June)
Spherical reflection of constant mean curvature surfaces
- 1996 Colloquium, University of Leipzig (two hour lecture)
Spherical reflection of constant mean curvature surfaces

AMS

- 2004 Houston, TX (May)
Symmetry of minimal surfaces in the three-sphere
- 2003 Madison, WI (October)
Roulades and variational problems
- 2002 Atlanta, GA (March)
Taylor's experiment and systems of elliptic equations
- 2001 Columbia, SC
Singular minimal graphs
- 2001 Chattanooga, TN (October; two talks)
Some comments on Taylor's Problem
Big MEMS
- 1999 Austin, TX (two talks)
Liquid bridges connecting planes
On Rosenberg's conjecture
- 1999 San Antonio, TX (contributed talk in Mathematics Education)
Symmetry, rigid motions, and a fourth dimension
- 1998 Davis, CA (two talks)
Minimal ends asymptotic to the helicoid
Quasiconcavity maximum principles
- 1997 Chattanooga, TN
Spherical reflection and spanning drops in a wedge