

Thomas A. Ivey

Department of Mathematics
College of Charleston
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Charleston, SC 29424
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- Education** 1992: Ph.D. in Mathematics, Duke University
Thesis title: *On Solitons for the Ricci Flow*
Advisor: Robert L. Bryant
1987: Bachelor of Mathematics, joint honours in Applied Math and Computer Science,
University of Waterloo (Ontario)
- Research Interests** Differential Geometry, Partial Differential Equations, Integrable Systems
(AMS Subject Classifications: 53, 58, 35Q)
- Academic Positions** Present: Professor, College of Charleston
(Assistant Professor 2000–2005, Associate Professor 2005–2011)
Fall 2006 & Fall 2013: Ulam Visiting Professor, University of Colorado, Boulder
August 1997–June 2000: Assistant Professor, Ball State University
July 1994–June 1997: Visiting Assistant Professor,
Case Western Reserve University
Sept. 1992–June 1994: S. E. Warshawski Assistant Professor,
University of California San Diego
- Teaching Experience** *Graduate courses:* geometry for teachers, classical & modern differential geometry,
algebraic curves, exterior differential systems, knot theory, complex analysis
Courses for mathematics students: single-variable calculus, vector calculus,
linear algebra, ordinary differential equations, partial differential equations,
dynamical systems, college geometry, axiomatic geometry, group theory
General education: college algebra, contemporary mathematics, elementary statistics
Interdisciplinary courses: mathematics in music
- NSF Grants** *Southeast Geometry Conference, 2010-2012,*
with A. Przeworski (funded, \$22,000)
RUI: Topology and Stability of Integrable Vortex Filament Motion,
with A. Calini (funded, \$150,000 for 2006-2010)
Southeast Geometry Conference, 2006-2008,
with A. Kasman (funded, \$18,000 for 2006-2008)
RUI: Integrable Dynamics of Knotted Vortex Filaments,
with A. Calini (funded, \$148,000 for 2002–2005)

Books

- Ricci Solitons* (book chapter co-authored with Ben Chow), pp. 1–53 in *The Ricci Flow: Techniques and Applications*, Mathematical Surveys and Monographs vol. 135, American Mathematical Society, 2007.
- Cartan for Beginners: Differential geometry via moving frames and exterior differential systems* (with J.M. Landsberg), Graduate Studies in Mathematics vol. 61, American Mathematical Society, 2003.

Papers

34. *Integrable Flows for Starlike Curves in Centraffine Space*, with A. Calini and G. Marí Beffa, SIGMA 9 (2013) 022, 21 pp.
33. *Ruled Austere Submanifolds of Dimension Four* (with M. Ionel), Differential Geometry and its Applications **30** (2012), 588–603.
32. *The Ricci-* Tensor for Hypersurfaces in $\mathbb{C}P^n$ and $\mathbb{C}H^n$* (with P.J. Ryan), Tokyo J. Math. **34** (2011), 445–471.
31. *A d'Alembert Formula for Hopf Hypersurfaces*, Results in Mathematics **60** (2011), 293–309.
30. *Stability of Small-Amplitude Torus Knot Solutions of the Localized Induction Equation*, (with A. Calini) J. Physics A **44** (2011), 335204 (17 pages).
29. *Austere Submanifolds of Dimension Four: Examples and Maximal Types* (with M. Ionel), Illinois Math J. **54** (2010), 713–746.
28. *The structure Jacobi operator for hypersurfaces in $\mathbb{C}P^2$ and $\mathbb{C}H^2$* (with P.J. Ryan), Results in Math., **56** (2009), 473–488.
27. *Symmetric Pseudospherical Surfaces I: General Theory* (with J. Dorfmeister and I. Sterling), Results in Math. **56** (2009), 3–21.
26. *Remarks on KdV-type Flows on Star-Shaped Curves*, (with A. Calini and G. Marí Beffa), Physica D **238** (2009), 788–797.
25. *Hopf Hypersurfaces of Small Hopf Principal Curvature in $\mathbb{C}H^2$* (with P.J. Ryan), Geometriae Dedicata **141** (2009), 147–161.
24. *Bäcklund Transformations and Darboux Integrability for Nonlinear Wave Equations* (with J. Clelland), Asian J. Math. **13** (2009), 13–64.
23. *Spectral stability analysis for periodic traveling wave solutions of NLS and CGL perturbations* (with S. Lafortune), Physica D **237** (2008), 1750–1772.
22. *Finite-gap solutions of the vortex filament equation: Isoperiodic Deformations* (with A. Calini), J. Nonlin. Sci. **17** (2007), 527–567.
21. *Geometry and Topology of Finite-Gap Vortex Filaments*, pp. 187–202 in Proceedings of the Seventh International Conference on Geometry, Integrability and Quantization (Varna, 2005), Bulgarian Academy of Sciences, 2006.
20. *Finite-gap solutions of the vortex filament equation: Symmetric Solutions and Genus One Solutions* (with A. Calini), J. Nonlin. Sci. **15** (2005), 321–361.
19. *Parametric Bäcklund Transformations I: Phenomenology* (with J. Clelland), Trans. Amer. Math. Soc., **357** (2005), 1061–1093.
18. *An inverse problem from sub-Riemannian geometry*, Pacific Math. J. **208** (2003), 111–124.
17. *Integrable Geometric Evolution Equations for Curves*, Contemp. Math. **285** (2001), 71–84.
16. *Connecting geometry, topology and spectra for finite-gap NLS potentials* (with A. Calini), Physica D **152/153** (2001), 9–19.
15. *Knot types, Floquet spectra, and finite-gap solutions of the Vortex Filament Equation* (with A. Calini), Math. & Computers in Simulation **55** (2001), 341–350.

14. *Helices, Hasimoto surfaces and Bäcklund transformations*,
Can. Math. Bull. **43**, (2000), 427–439.
13. *Minimal Curves of Constant Torsion*,
Proc. Amer. Math. Soc. **128** (2000), 2095–2103.
12. *Topology and Sine-Gordon Evolution of Constant Torsion Curves*
(with A. Calini), Physics Letters A **254** (1999) 170–178.
11. *Knot types, homotopies and stability of closed elastic rods* (with D. Singer),
Proc. London Math. Soc. **79** (1999), 429–450.
10. *Affine Isometric Embedding for Surfaces*, Geom. Ded. **75** (1999), 235–243.
9. *Bäcklund transformations and knots of constant torsion* (with A. Calini)
J. Knot Theory and its Ramifications **7** (1998), 719–746.
8. *On Isometric and Minimal Isometric Embeddings* (with J.M. Landsberg)
Duke Math. J. **89** (1997), 555–576.
7. *Local Existence of Ricci Solitons*, Man. Math. **91** (1996), 151–162.
6. *Affine Isometric Embeddings and Rigidity*, Geom. Ded. **64** (1997), 125–144.
5. *Ricci Solitons on Compact Kähler Surfaces*,
Proc. Amer. Math. Soc. **125** (1997) # 4, 1203–1208.
4. *The Ricci Flow on Radially Symmetric \mathbb{R}^3* ,
Comm. Part. Diff. Eq. **19** (1994), # 9/10, 1481–1500.
3. *Surfaces with orthogonal families of circles*,
Proc. Amer. Math. Soc. **123** (1995) # 3, 865–872.
2. *New Examples of Complete Ricci Solitons*,
Proc. Amer. Math. Soc. **122** (1994) # 1, 241–246.
1. *Ricci Solitons on Compact 3-Manifolds*,
Differential Geometry and Its Applications **3** (1993), 301–307.

**In
Preparation**

35. *Austere Submanifolds in Complex Projective Space*, with M. Ionel
36. *On Bäcklund Transformations of sine-Gordon Type*, with J. Clelland
37. *Integrable Structure of the $1/\kappa$ Curve Flows*
38. *Hypersurfaces in $\mathbb{C}P^2$ and $\mathbb{C}H^2$ with Two Distinct Principal Curvatures*, with P.J. Ryan
39. *A new class of ruled real hypersurfaces in $\mathbb{C}P^2$ and $\mathbb{C}H^2$* , with P.J. Ryan

Reprints and preprints are available at my web page:
<http://iveyt.people.cofc.edu/>

Recent Talks

- “
- “In Time and Out of Tune: Some perspectives on consonance and dissonance”, Bridges Lecture, St. Jerome’s University, Waterloo, Canada, March 2013.
- “Five Lectures on Moving Frames”, Summer School in Differential Geometry, Ewha Woman’s University, Seoul, South Korea, July 2012.
- “Austere Submanifolds in Complex Projective Space”, Special Session on Differential Geometry, Canadian Math. Society Winter Meeting, Toronto, Dec. 2011; extended version given at the Workshop on Manifolds with Special Holonomy, Banff International Research Station, May 2012
- “Small(er) is Beautiful: Twistor Space Constructions in Submanifold Geometry”, Workshop on Moving Frames, Centre de Recherches Mathématiques, Université de Montréal, June 2011; repeated at “Moderne Aspekte in der Differentialgeometrie” Workshop at Leibniz Universität, Hannover, June 2011.
- “Isoperiodic Deformations and Stability for Finite-Gap Vortex Filaments”, Geometry Seminar, Emory University, March 2011; repeated at Universidade Federal do Rio de Janeiro, July 2012; at University of Surrey, September 2012; and at Trinity College, Dublin, February 2013.
- “Playing the Numbers: Some highlights from *Mathematics in Music*”, colloquium, University of Toledo, Dec. 2010
- “Ruled Austere 4-Folds and Holomorphic Curves”, Special Session on Submanifolds, AMS Meeting, Notre Dame, Nov. 2010.
- “Hopf Hypersurfaces and the Method of Darboux”, Conference on Geometry and Partial Differential Equations, in honor of Keti Tenenblat, University of Brasilia, May 2010.
- “Integrable Curve Flows in Centro-Affine Space”, Special Session on Geometric Flows, Moving Frames and Integrable Systems, AMS Meeting, St. Paul, Minnesota, April 2010; repeated at College of Charleston.
- “Cable Knot Solutions of the Vortex Filament Flow”, Special Session on Differential Geometry, Joint Canadian-Mexican Math Society Meeting, Vancouver, August 2009.
- “Some Results on Austere 4-Manifolds”, Geometry Seminar, University of Rochester, Nov. 2008
- “Finite-Gap Solutions to the Vortex Filament Flow: An Introduction”, International Conference on Nonlinear Waves—Theory and Applications, Tsinghua University, Beijing, June 2008.
- “Bäcklund Transformations and Darboux Integrability for Nonlinear Wave Equations”, Workshop on Exterior Differential Systems and the Method of Equivalence, MSRI, May 2008.
- “Hopf Hypersurfaces in the Complex Hyperbolic Plane”, Geometry Seminar, McMaster University, April 2007; repeated at Midwest Geometry Conference, University of Iowa, May 2007; and at Lehigh Geometry/Topology Conference, Oct. 2007.
- “Closed Solutions of the Vortex Filament Flow”, Applied Math Seminar, University of Wisconsin, Madison; repeated at Fields Institute, March 2007
- “Five Lectures on Exterior Differential Systems”, Workshop on Differential Geometry and Applications, LaTrobe University (Melbourne, Australia), June 2006

Professional Activities March 2012: Organizer, Southeast Geometry Conference, College of Charleston
May 2011: Co-organizer, Southeast Geometry Conference, University of South Carolina
April 2010: Organizer, Southeast Geometry Conference, College of Charleston
April 2009: Co-organizer, Special Session on Geometry of Differential Equations, AMS Meeting, NC State University
April 2008–Nov. 2009: Guest Editor, SIGMA special issue on “Elie Cartan and Differential Geometry”
March 2008: Co-organizer, Southeast Geometry Conference, University of South Carolina
Fall 2006: Organizer, Ulam Seminar on Discrete Integrable Systems and Geometry, UC Boulder
Spring 2006: Organizer, Southeast Geometry Conference, College of Charleston
Fall 2005: Participant, Discrete Integrable Systems Seminar, College of Charleston
Spring 2004–present: Organizing Committee, Southeast Geometry Conference
Fall 2003/Spring 2004: Organizer, Geometry Seminar, College of Charleston
2000–present: Referee for *Contemporary Mathematics*, *Differential Geometry and its Applications*, *Houston Math Journal*, *Journal of Experimental Mathematics*, *Journal of Lie Theory*, *Journal of Nonlinear Science*, *Proceedings of the London Mathematical Society*, *Duke Math Journal*, *Physica D*, *Journal of Geometry and Physics*, *International Mathematical Research Notices*, *Proceedings of the Royal Society of Edinburgh*, *Communications in Analysis and Geometry*, *Journal of Geometric Analysis*
1996–present: Reviewer for *Mathematical Reviews*

Internal Grants Dec. 2011: *Austere Submanifolds in Projective Space*,
College of Charleston Faculty Research Grant (\$3000)
April 2011: *Austere Submanifolds and Integrable Curve Flows*
Mathematics Department Summer Travel Funds (\$1600)
Nov. 2008: *Austere and Calibrated Submanifolds*,
College of Charleston Faculty Research Grant (one course teaching release)
Nov. 2001, Nov. 2004: Center for Teaching and Learning Travel Grant
for attending Joint Mathematics Meetings
May 2001: *Geometry Course Development*,
CETL proposal with A. Harper *et al.* (\$1500)
Jan. 2001: *Geometry of Bäcklund Transformations*,
Faculty Research Grant (\$2500)

Department and College Service Fall 2012–present: Faculty Senator
Fall 2010: Member, Ad-hoc Departmental Committee on Evaluation of Teaching
Fall 2010–Spring 2011: Member, College Graduate Curriculum Committee
Fall 2009–Spring 2012: Member, Departmental Search Committee
Fall 2009–Spring 2010: Chair, College Library Committee
Fall 2008–present: Member, Departmental Curriculum Committee
Fall 2008–Spring 2009: Member, College Graduate Curriculum Committee
Spring 2008: Member, Departmental Search Committee
Fall 2007–Spring 2008: Member, College Honors Program Committee
Fall 2005: Member, Ad-Hoc Committee on Linear Algebra Curriculum
Fall 2004–Spring 2006: Member, Mathematics Education Search Committee
Spring 2003–Spring 2006: Member, Departmental Research Committee
Spring 2004: Member, Departmental Search Committee
Fall 2003–Spring 2006: Member, College Library Committee
Fall 2003: Coach, Putnam Mathematics Contest Team
Fall 2003: Advisor, College of Charleston Math Club
Spring 2003–Spring 2004: Coordinator, Math Student Study Area
Spring 2003: Member, Ad-Hoc Committee on Revising T & P Guidelines
Spring 2003: Member, Ad-Hoc Committee on Departmental Space Requirements
Fall 2002–Spring 2006: Member, Departmental M.S. Program Steering Committee
Fall 2002–Spring 2006: Member, Departmental Committee on the Major
Fall 2001–Fall 2003: Member, Departmental Committee on Mathematics for Teachers
Spring 2001: Member, Ad-Hoc Committee for Proposing an SMFT Geometry Course

References

Prof. Robert Bryant, Director,
Mathematical Sciences Research Institute,
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Prof. Niky Kamran,
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McGill University
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Prof. Thomas Kunkle (teaching reference),
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Prof. Peter Olver,
Department of Mathematics, University of Minnesota
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