Tom Bella   Curriculum Vitae

University of Rhode Island   http://www.math.uri.edu/~tombella
Department of Mathematics   tombella@uri.edu
5 Lippitt Road
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Research Interests

Scientific computing, numerical analysis and numerical linear algebra, matrix theory and structured matrices, especially matrices with quasiseparable structure or other rank structures; orthogonal polynomials; indefinite inner product spaces; signal processing and mathematical control theory; algebraic coding theory.

Employment

Associate Professor of Mathematics   *2014 to present*
Assistant Professor of Mathematics   *2008 to 2014*
    Department of Mathematics, University of Rhode Island, Kingston, RI.

Full Time Teaching Assistant   *2003 to 2008*
    Department of Mathematics, University of Connecticut, Storrs, CT.

Education

Ph.D. Mathematics
    Topics in Numerical Linear Algebra Related to Quasiseparable and Other Structured Matrices
    Advisor: Professor Vadim Olshevsky
    University of Connecticut, Storrs, CT, 2008.

M.S. Mathematics
    University of Connecticut, Storrs, CT, 2005.

B.S. Mathematics, *Magna cum Laude*
    Adelphi University, Garden City, NY, 2003.

B.S. Physics, *Magna cum Laude*
    Adelphi University, Garden City, NY, 2003.

Ph.D. Students

Jenna Reis, Ph.D.
    The spectral connection matrix for classical real orthogonal polynomials
    Department of Mathematics, University of Rhode Island, 2015.

Honors & Awards

College of Arts and Sciences Student Success Award *2017*
Awarded for my work on the math placement exam and algorithms and their effect on student success rates in our gateway STEM courses.

Providence–Warwick Ambassador Award *2013*
The Providence Warwick Convention and Visitors Bureau recognizes "local business and community leaders, who are not meeting planners by trade, but were instrumental in bringing a meeting or event to our state." The award is for competing for, and successfully attracting, the ILAS 2013 Annual Meeting.

Publications

Krylov Subspace Methods

1. *An Iterative Method for Computing a Few Eigenpairs of a Large Sparse Symmetric Matrix* (with J. Baglama, J. Picucci), SIAM J. Sci. Comput. Special session on iterative methods (2021)

Perturbation Theory

2. *Lipschitz stability of canonical Jordan bases of H-selfadjoint matrices under structure-preserving perturbations* (with V. Olshevsky, U. Prasad), Linear Algebra and its Applications, Volume 428, Issues 8-9, 15 April 2008, Pages 2130-2176 (2008)

Algebraic Coding Theory

3. *Ranks of Hadamard Matrices and Equivalence of Sylvester Hadamard and Pseudo-Noise Matrices* (with V. Olshevsky, L. Sakhnovich), Recent Advances in Matrix and Operator Theory, 35–46, Oper. Theory Adv. Appl., 179, Birkhauser, Basel, (2008)

4. *Equivalence of Hadamard matrices and pseudo-noise matrices* (with V. Olshevsky, L. Sakhnovich), Advanced Signal Processing Algorithms, Architectures, and Implementations XV, Proceedings of SPIE Volume: 5910, Franklin T. Luk, Editors, 59100V (2005)

Numerical Linear Algebra

5. *Nested Product Decomposition of a Quasiseparable Matrix* (with V. Olshevsky, M. Stewart), SIAM. J. Matrix Anal. & Appl., 34(4), 15201555 (2013)

6. *Fast inversion of polynomial-Vandermonde matrices for polynomial systems related to order one quasiseparable matrices* (with Y. Eidelman, I. Gohberg, V. Olshevsky, E. Tyrtyshnikov), Advances in Structured Operator Theory and Related Areas, Operator Theory: Advances and Applications, Vol. 237, Pages 79–106 (referred according to the standards of the Journal of Integral Equations and Operator Theory), Kaashoek, Marinus A.; Rodman, Leiba; Woerdeman, Hugo J. (Eds.) (2013)

7. *A Traub-like algorithm for Hessenberg-quasiseparable-Vandermonde matrices of arbitrary order* (with Y. Eidelman, I. Gohberg, V. Olshevsky, E. Tyrtyshnikov, P. Zhlobich), Numerical methods for structured matrices and applications, 127–154, Operator Theory: Advances and Applications, 199, Birkhauser Verlag, Basel (2010)

8. *A fast Bjorck-Pereyra-type algorithm for solving Hessenberg-quasiseparable-Vandermonde systems* (with Y. Eidelman, I. Gohberg, I. Koltracht, V. Olshevsky), SIAM. J. Matrix Anal. & Appl., Volume 31, Issue 2, pp. 790–815 (2009)

9. *A Bjorck-Pereyra-type algorithm for Szego-Vandermonde matrices based on properties of unitary Hessenberg matrices* (with Y. Eidelman, I. Gohberg, I. Koltracht, V. Olshevsky), Linear Algebra and Applications, Volume 420, Issues 2–3 pp. 634–647 (2007)

Orthogonal Polynomials

10. *The Spectral Connection Matrix for Any Change of Basis within the Classical Real Orthogonal Polynomials* (with J. Reis), Mathematics, Special Issue New Trends in Applications of Orthogonal Polynomials and Special Functions, Mathematics 2015, 3, 382-397 (2015)

11. *The spectral connection matrix for classical orthogonal polynomials of a single parameter* (with J. Reis), Linear Algebra and Its Applications, Volume 458, 1 October 2014, Pages 161182 (2014)

12. *Classifications of recurrence relations via subclasses of (H,k)-quasiseparable matrices* (with V. Olshevsky, P. Zhlobich), Numerical Linear Algebra in Signals, Systems and Control, Lecture Notes in Electrical Engineering, Springer-Verlag, Lecture Notes in Electrical Engineering, Vol. 80, 1st Edition., 23-54 (2011)

13. *A quasiseparable approach to five-diagonal CMV and companion matrices* (with V. Olshevsky, P. Zhlobich), Linear Algebra and its Applications, Volume 434, Issue 4, 15 February 2011, Pages 957-976 (2011)

14. *Signal Flow Graph Approach to Inversion of (H,m)-Quasiseparable Vandermonde Matrices and New Filter Structures* (with V. Olshevsky, P. Zhlobich), Linear Algebra and its Applications, Volume 432, Issue 8, 1 April 2010, Pages 2032-2051 (2010)

15. *Computations with quasiseparable polynomials and matrices* (with Y. Eidelman, I. Gohberg, V. Olshevsky), Theoretical Computer Science, Volume 409, Issue 2, 17 December 2008, Pages 158-179 (2008)

Presentations

Invited Minisymposium Talks

1. *Stability of Methods for Quasiseparable Matrices*, Minisymposium on Structured Matrices, ICIAM 2011, July 18 - 22, 2011, Vancouver, BC, Canada. (2011)

2. *Structured Matrices and Some Results on Quasiseparable Matrices*, Colloquium Talk, Central Connecticut State University Mathematics Department (2011)

3. *Stability of Methods for Quasiseparable Matrices*, Minisymposium on Structured Matrix Computations, SIAM Conference on Computational Science and Engineering, Reno, NV, USA (2011)

4. *Stability of Methods for Quasiseparable Matrices*, New England Numerical Analysis Day 2010, Worcester Polytechnic Institute, Worcester, MA (2010)

5. *Stability of Methods for Quasiseparable Matrices*, Minisymposium on Large Scale Matrix Computation, AMS Spring Southeastern Sectional Meeting in Lexington, KY, USA, March 27-28, 2010 (Meeting #1057) (2010)

6. *Arbitrary Order Hessenberg Quasiseparable Matrices and Polynomials*, Three-Part Minisymposium on Quasiseparable Matrices and Polynomials (minisymposium speaker and co-organizer), SIAM Applied Linear Algebra 2009, Monterey, CA, USA (2009)

7. *Arbitrary Order Hessenberg Quasiseparable Matrices and Polynomials*, Northern Illinois University Linear Algebra Meeting 2009, DeKalb, IL, USA (2009)

8. *Classifications of quasiseparable matrices in terms of recurrence relations*, Structured Linear Algebra Problems: Analysis, Algorithms, and Applications 2008 - Cortona, Italy (2008)

9. *Fast algorithms for polynomial-Vandermonde matrices related to quasiseparable matrices*, Minisymposium on Interpolation Problems, Eighteenth International symposium on Mathematical Theory of Networks and Systems (MTNS2008) (2008)

10. *Fast algorithms for polynomial-Vandermonde matrices related to quasiseparable matrices*, Minisymposium on Structured Matrices, IWOTA 2008 - Williamsburg, VA, USA (2008)

11. *Eigenproblems for quasiseparable matrices*, Minisymposium on Eigenproblems: Theory and Computation, ILAS 2008 - Cancun, Mexico (2008)

12. *Quasiseparable Matrices and Polynomials*, Colloqium Talk, Georgia State University, Atlanta, GA (2008)

13. *Fast algorithms for polynomial Vandermonde matrices related to quasiseparable matrices*, Minisymposium on Structured matrix algorithms: complexity and stability, ICIAM 2007 - Zurich, Switzerland - 6th International Congress on Industrial and Applied Mathematics (2007)

14. *Fast algorithms for polynomial Vandermonde matrices related to quasiseparable matrices*, Minisymposium on Structured Matrices and Fast Algorithms, SIAM 2006 - Boston, MA (2006)

15. *A Parker-Forney-Traub like algorithm for quasiseparable-Hessenberg-Vandermonde matrices*, Minisymposium on Structured Matrices, IWOTA 2005 - Storrs, CT, USA (2005)

Refereed Talks

16. *The Equivalence of Pseudo-noise and Hadamard-Sylvester matrices*, SPIE 2005 - San Diego, CA (2005)

Contributed Talks

17. *Quasiseparable matrices and polynomials*, Gene Golub Memorial Conference, Dartmouth, MA, USA (2008)

18. *Quasiseparable matrices and polynomials*, Hans Schneider 80th Birthday Meeting, UConn, Storrs, CT (2007)

19. *The Equivalence of Pseudo-noise and Hadamard-Sylvester matrices*, ILAS 2005 - Regina, Canada (2005)

20. *The generalized Bjorck-Pereyra algorithm for Szego-Vandermonde matrices based on properties of unitary Hessenberg matrices*, ILAS 2005 - Regina, Canada (2005)

21. *Introduction to Linear Codes*, Series in Linear Codes, SIGMA Seminar, University of Connecticut (2004)

22. *The Equivalence of Pseudo-noise and Hadamard-Sylvester matrices*, ILAS 2004 - Coimbra, Portugal (2004)

Conference and Minisymposium Organization

1. Scientific Organizing Committee, for the 19th Conference of the International Linear Algebra Society (ILAS 2014), August 6–9, 2014, Seoul, Korea.

2. Chair, Local Organizing Committee, and Co–Chair, Scientific Organizing Committee, for the 18th Conference of the International Linear Algebra Society (ILAS 2013), June 3–7, 2013, Providence, RI. Wrote the proposal for URI to host the meeting, and as local organizer managed all aspects of the conference.

3. Minisymposium on Quasiseparable Matrices and Polynomials, (three–part, twelve speaker minisymposium), SIAM Conference on Applied Linear Algebra, Monterey, CA, USA. October 26-29, 2009.

4. New England Numerical Analysis Day Advisory Committee   *2010 to present*
   Since begun at URI in 2009, New England Numerical Analysis Days have been held at Worcester Polytechnic Institute, UMass Dartmouth, and UMass Amherst.

5. New England Numerical Analysis Day 2009 (co–organizer, with James Baglama and Li Wu), University of Rhode Island, Kingston, RI, USA. April 4, 2009.

Grants

URI Collaborative Explorations in Mathematics and Science, 2013   *$8,000*
  Modifying MTH Gateway Courses   *(requested, funded)*

URI Provost's Office, 2011–2013   *$13,900*
  A New Program for Use of Computer Algebra Systems in Calculus at URI   *(requested, funded)*

University of Rhode Island Foundation, 2011   *$3,470*
  Online General Education Math Courses   *(requested, funded)*

NSF CAREER Grant, 2010-2015   *$444,388*
  Structured Scientific Computing for Rank Structured Matrices: *(requested, not funded)*
  Theory, Algorithms, and Software

SIAM/NSF Early Career Travel Award, 2009   *$905*
  (to attend the SIAM Conference on Applied Linear Algebra 2009)   *(requested, funded)*

University of Rhode Island General Education Grant, 2009   *$2,000*
  (to create a new general education course in Elementary Cryptanalysis)   *(requested, funded)*

University of Rhode Island URI Visiting Scholars Program, 2009   *$500*
  (to fund attendee travel to New England Numerical Analysis Day 2009 at URI)   *(requested, funded)*

University of Rhode Island Foundation, 2009   *$1,500*
  (to fund New England Numerical Analysis Day 2009 at URI)   *(requested, funded)*

Editorial Service

Managing Editor, Electronic Transactions on Numerical Analysis   *2012 to present*

Refereeing
  American Control Conference (Baltimore, MD, June 30-July 02, 2010)
  Electronic Journal of Linear Algebra
  Electronic Transactions on Numerical Analysis
  IEEE Transactions on Signal Processing
  Journal of Integral Equations and Operator Theory
  Linear Algebra and its Applications
  Linear and Multilinear Algebra
  Numerical Algorithms
  SIAM Journal of Matrix Analysis
  SIAM Journal on Scientific Computing

Teaching Experience

Tenure–Track Faculty Member, University of Rhode Island   *Fall 2008 to present*
Courses taught include the following.

MTH 105	Elementary Mathematical Codebreaking
MTH 132	Applied Calculus II
MTH 141	Calculus I
MTH 142	Calculus II
MTH 215	Introductory Linear Algebra
MTH 243	Calculus III
MTH 362	Advanced Engineering Mathematics I
MTH 418	Matrix Analysis
MTH 471	Introduction to Numerical Analysis
MTH 513	Linear Algebra
MTH 571	Numerical Analysis

Developed two new courses, MTH 571, a first graduate course in Numerical Analysis, and MTH 105, a general education course in methods of cryptanalysis for students with only high school mathe-

matics background.

Calculus II Course Coordinator *Fall 2011 to Spring 2014*
Responsible for managing approximately 12 sections per year of MTH 142 – Calculus II. This entails creating the common syllabus, managing the online homework platform, managing all common exams, and data collection for assessment. Several teaching assistants teach MTH 142, so coordination also includes observing and evaluating their teaching.

Full Time Teaching Assistant, University of Connecticut *Fall 2003 to Spring 2008*
Courses taught include introductory level and general education courses, the calculus sequence, and beginning mathematics major courses such as differential equations and linear algebra. Sole instructor for all courses taught.

Outreach Activities

Diagnostic Mathematics Exams for RI High Schools *2014, 2017*
Provided access to the new URI placement exams to a select group of high school students as a part of an effort to align high school and college–level mathematics expectations. Afterwards, we provided detailed problem–level statistics and met with high school instructors and administrators to discuss the results.

Host, URI Calc–Bowl *2011 to 2015*
URI Calc–Bowl is an annual regional mathematics competition designed for college and high school students who are taking or have taken calculus courses. I have hosted this event for the past five years.

References

Available upon request.