CURRICULUM VITÆ

John Zweck[1]

August 13th, 2025

EDUCATION, EMPLOYMENT HISTORY AND HONORS

Educational History

B.Sc. 1988:   University of Adelaide, Adelaide, South Australia, Mathematical Sciences (*Honours*)

Ph.D. 1993:   Rice University, Houston TX, Mathematics

Ph.D. Thesis: *Compactification problems in the theory of characteristic currents associated with a singular connection*, Advisor: F. Reese Harvey

Employment History - principal positions

2025–   Professor, Department of Mathematics, New York Institute of Technology

2012–2024   Professor, Department of Mathematical Sciences, University of Texas at Dallas

2006–2012   Associate Professor, Department of Mathematics and Statistics, University of Maryland Baltimore County,

2003–2006   Assistant Professor, Department of Mathematics and Statistics, University of Maryland Baltimore County

2003   Research Associate Professor, Department of Computer Science and Electrical Engineering, University of Maryland Baltimore County

2000–2002   Research Associate, Department of Computer Science and Electrical Engineering, University of Maryland Baltimore County

1998–2000   Postdoctoral Researcher, Department of Computer Science and Albuquerque High Performance Computing Center, University of New Mexico

1995–1998   Assistant Professor, Department of Mathematics, University of Nevada Reno

1994–1995   Visiting Assistant Professor, Department of Mathematics, State University of New York at Stony Brook

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[1]Professional web pages: https://site.nyit.edu/bio/jzweck and https://johnzweck.phd

1993–1994   Lecturer, Department of Mathematics, Rice University

1988–1993   Graduate Teaching Assistant, Department of Mathematics, Rice University

Employment History - concurrent appointments

2012–2024   Affiliate Professor, Department of Science/Mathematics Education, University of Texas at Dallas

2012–2014   Adjunct Professor of Computer Science and Electrical Engineering, University of Maryland Baltimore County

Spring 2007   Research Scholar, Department of Mathematics, University of Texas at Austin

2006–2012   Affiliate Associate Professor, Department of Computer Science and Electrical Engineering, University of Maryland Baltimore County

1996–1997   Visiting Lecturer, Department of Mathematics, University of Texas at Austin

Professional recognitions and honors

2023   University of Texas System Regents Outstanding Teaching Award (ROTA)

2022   President's Teaching Excellence Award in Undergraduate Instruction for Tenure-System Faculty, University of Texas at Dallas

2020   Honorable Mention for President's Teaching Excellence Award in Undergraduate Instruction for Tenure-System Faculty, University of Texas at Dallas

Professional memberships

2000–   Society for Industrial and Applied Mathematics

2000–2012   Optical Society of America

1993–2014   American Mathematical Society

EXTERNAL FUNDING

Proposals Submitted

1. *Combined experimental and computational studies of complex electron velocity distribution functions*, U.S. Department of Energy, Fusion Energy Sciences. Lead PI: M. Goeckner (UT Dallas), NYIT PI: J. Zweck, 08/01/2025-08/31/2028, $111,059 (NYIT), $871,025 (Combined total), Pending

Grants Awarded (NYIT)

1. *Collaborative Research: Stability and and instability of periodically stationary nonlinear waves with applications to fiber lasers*, P.I.: J. Zweck, U.Missouri P.I.: Y. Latushkin, National Science Foundation, DMS Applied Mathematics, 01/01/2025-08/31/2025, $28,247 [Award transfered from UT Dallas to NYIT]

Grants Awarded (UT Dallas)

1. *Partnering to Recruit, Engage, Prepare, and Support New STEM Teachers for North Dallas Area Schools* P.I.: M. Urquhart, co-P.I.'s: K. Donaldson, K. York, J. Zweck. National Science Foundation DUE: Robert Noyce Teacher Scholarship Program. 06/01/2024-05/31/2029, $1,199,934

2. *IMPRESS-U: Spectral and geometric methods for damped wave equations with applications to Fiber lasers: Supplemental Funding Request DMS-2106203 Collaborative Research: Stability and Instability of Periodically Stationary Nonlinear Waves with Applications to Fiber Lasers.* P.I.: J. Zweck. National Science Foundation, DMS Applied Mathematics. 01/12/2024-02/28/2025, $48,180. U.Missouri P.I.: Y. Latushkin.

3. *Collaborative Research: Stability and and instability of periodically stationary nonlinear waves with applications to fiber lasers.* P.I.: J. Zweck. National Science Foundation, DMS Applied Mathematics. 09/1/21-08/31/24, $240,922. U.Missouri P.I.: Y. Latushkin.

4. *Collaborative Research: Multiphysics Modeling and Analysis of Thermo-Visco-Acoustic Equations with Applications to the Design of Trace Gas Sensors.* P.I.: J. Zweck, co-P.I. S.E. Minkoff. National Science Foundation, DMS Computational Mathematics. 09/01/16-08/31/19, $149,156. Baylor P.I.: R. Kirby.

5. *MATH: Supplement: Pedagogical Coaches to Develop Geometric Imagination and Conceptual Thinking for Calculus III,* Supplement to *The UTeach Dallas Noyce Teacher Scholarship Program.* P.I.: M. Urquhart, co-P.I.'s: S. Minkoff, H. Montgomery, J. Zweck. National Science Foundation: Robert Noyce Teacher Scholarship Program. 8/1/15-7/31/17, $80,115.

6. *EDT: Team Training Mathematical Scientists through Industrial Collaborations.* P.I.: S. Minkoff, co-PI's: Y. Cao, Y. Gel, F. Pereira, J. Zweck. National Science Foundation. 6/1/15 - 5/31/18, $598,722.

7. *The UTeach Dallas Noyce Teacher Scholarship Program* P.I.: M. Urquhart, co-P.I.'s: S. Minkoff, H. Montgomery, J. Zweck. National Science Foundation: Robert Noyce Teacher Scholarship Program. 9/1/14-8/31/19, $799,688.

Internal Grants Awarded (UT Dallas)

1. *Recruitment of Women Faculty into the Mathematical Sciences at UTD.* P.I. J. Zweck, co-P.I.'s: S. Biswas, V. Dragovic, Y. Lou, and S. Minkoff. UTD ASPIRE^2 STRIDE Faculty Recruitment Grant Program. 2022–2023, $1,500.

2. *Extension of Active Learning from Calculus to Linear Algebra.* P.I.: R. Dahal, co-P.I.: J. Zweck. Instructional Improvement Award, UT Dallas Center for Teaching and Learning. 2018–2019, $3,600.

3. *TA Training for more Active Learning in Mathematical Sciences Service Courses.* P.I.'s J. Zweck and Mietek Dabkowski. Instructional Improvement Award, UT Dallas Center for Teaching and Learning. 2017–2018, $6,500.

Grants Awarded (UMBC)

1. *Modulation format identification under polarization mode dispersion impairments and identification of high-order formats.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2012, $75,000.

2. *Format Independent Receiver for Digital Optical Data Systems, Extension of Phase II.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2011–2012, $62,500.

3. *Geometrical Dependence of Tuning Fork Q-factors for Optimized QEPAS Sensors.* P.I. J. Zweck, co-P.I.'s: S. Minkoff and F. Tittel. Subgrant from National Science Foundation: Engineering Research Center on Mid InfraRed Technologies for Health and the Environment. 2011–2012, $46,200.

4. *Format Independent Receiver for Digital Optical Data Systems, Extension of Phase II.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2010–2011, $40,000.

5. *Design Optimization of Tuning Forks for QEPAS and ROTADE Sensors.* P.I. J. Zweck, co-P.I.'s: S. Minkoff and A. Kosterev. Subgrant from National Science Foundation: Engineering Research Center on Mid InfraRed Technologies for Health and the Environment. 2010–2011, $47,380.

6. *Laser Modeling Analysis.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2010, $25,000.

7. *Development, verification, and validation of three-dimensional models for QEPAS and ROTADE sensors.* P.I. J. Zweck, co-P.I.'s: S. Minkoff and A. Kosterev. Subgrant from National Science Foundation: Engineering Research Center on Mid InfraRed Technologies for Health and the Environment. 2009–2010, $46,700.

8. *Format Independent Receiver for Digital Optical Data Systems, Phase II.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2009-2010, $87,484.

9. *Laser Modeling Analysis.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2009, $25,000.

10. *Format Independent Receiver for Digital Optical Data Systems, Phase I.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Subcontract from John Hopkins Applied Physics Laboratory. 2008, $50,000.

11. *Computational Modeling of Quartz-Enhanced Photoacoustic and Optothermal Spectroscopy Sensors.* P.I. J. Zweck, co-P.I.'s: S. Minkoff and A. Kosterev and C. Menyuk. Subgrant from National Science Foundation: Engineering Research Center on Mid InfraRed Technologies for Health and the Environment. 2008–2009, $48,000.

12. *Frequency Metrology with Short Pulse Lasers.* P.I.: C. Menyuk, co-P.I.: J. Zweck. Technion Foundation. 2007–2008, $50,000.

13. *Computational Modeling of Quartz-Enhanced Photoacoustic Spectroscopy Sensors.* P.I. J. Zweck, co-P.I.'s: S. Minkoff and A. Kosterev and C. Menyuk. Subgrant from National Science Foundation: Engineering Research Center on Mid InfraRed Technologies for Health and the Environment. 2007–2008, $48,000.

14. *Computational Modeling of Quartz-Enhanced Photoacoustic Spectroscopy Sensors.* P.I. J. Zweck, co-P.I.'s: S. Minkoff and A. Kosterev and C. Menyuk. Subgrant from National Science Foundation: Engineering Research Center on Mid InfraRed Technologies for Health and the Environment. 2006–2007, $40,000.

15. *Statistical characterization of the roughness of the cingulate gyrus in schizophrenic and normal subjects.* P.I.: J. Zweck. Center for Imaging Science, Whiting School of Engineering, Johns Hopkins University. 2005, $7,000.

16. *Accurate calculation of bit-error ratios in optical fiber communications systems.* P.I. C. Menyuk, co-P.I.'s: G.M. Carter, J.M. Morris and J. Zweck. National Science Foundation: Division of Electrical and Communications Systems. 2004–2007, $232,800.

17. *Numerical simulation and analysis of fiber optic compensators.* P.I.: S. Minkoff, co-P.I.: J. Zweck. NASA Goddard/UMBC Center for Advanced Study of Photonics Research. 2002–2003, $34,937.

18. *Polarization effects in long-haul wavelength-division multiplexed optical communications systems* P.I.: L. Yan, co-P.I.'s: B.S. Marks, G.M. Carter, C.R. Menyuk, and J. Zweck. National Science Foundation, Division of Electrical and Communications System. 2002–2005, $210,000.

19. *Cycles, residues and global problems in geometry.* P.I.: B. Lawson, co-P.I.'s: M-L. Michelsohn and J. Zweck. National Science Foundation, Division of Mathematical Sciences. 1995–1997, $300,000.

20. Schlumberger Foundation Fellowship, Rice University, 1991-1992.

PATENTS AND PAPERS

U.S. Patents awarded

1. E.J. Adles, M.L. Dennis, R.M. Sova, J.E. Sluz, M.G. Taylor, C.R. Menyuk, and **J. Zweck**. 2015. *Cueing System for Universal Optical Receiver.* United States Patent No. 8,971,701 B2, Mar. 3.

2. J.M. Morris, R. Holzlöhner, A. Mahadevan, C.R. Menyuk, and **J. Zweck**. 2012. *System and method for estimating probabilities of events.* United States Patent No. 8,144,757 B2, Mar. 27th.

U.S. Patents provisional applications

1. **J. Zweck** and C.R. Menyuk. 2012. *Method for Estimation of Chromatic Dispersion for a Universal Optical Receiver.* [United States Provisional Patent Application, 61695025].

Articles submitted for publication

1. E. Gallo, **J. Zweck**, and Y. Latushkin. 2025 "Numerical Fredholm determinants for matrix-valued kernels on the real line." *Integral Equations and Operator Theory*, pp. 1–29. [*submitted, July 2025*] https://arxiv.org/abs/2507.22875

2. M. Goeckner, D. Harcey, R.Q. Pederson, A. Niyonzima, and **J. Zweck**. 2025 "A generalized reduction scheme for the Stochastic Weighted Particle Method." *SIAM Journal on Scientific Computing*, pp. 1–26. [*submitted, June 2025*]

Works in progress

1. E. Gallo, **J. Zweck**, and Y. Latushkin. "Stability of Ginzburg-Landau pulses via Fredholm determinants of Birman-Schwinger operators."

2. A. Gettemy, S. Minkoff, **J. Zweck**, I. Mishra, T. Griffith, and E. Spiller. "Leading Edge Erosion in Wind Turbine Blades."

3. **J. Zweck**, S. Lama, and M. Goeckner. "On the convergence rate of the stochastic weighted particle method."

Articles in refereed journals

1. **J. Zweck**, Y. Latushkin and E. Gallo. 2025. "A regularity condition under which integral operators with operator-valued kernels are trace class." *Bol. Soc. Mat. Mex.* **31** Article No. 38, pp. 1–30. DOI: 10.1007/s40590-025-00718-8

2. V. Shinglot and **J. Zweck**. 2024. "Floquet stability of periodically stationary pulses in a short-pulse fiber laser." *SIAM J. on Applied Mathematics* **84** (3), pp. 961–987. DOI: 10.1137/23M1598106

3. A. Mozumder, A. Safin, S. Minkoff, and **J. Zweck**. 2023. "A two-way coupled model of visco-thermo-acoustic effects in photoacoustic trace gas sensors." *SIAM J. Applied Mathematics* **83** (3), pp. 1074–1097. DOI: 10.1137/21M1447659

4. V. Shinglot and **J. Zweck**. 2023. "The essential spectrum of periodically-stationary pulses in lumped models of short-pulse fiber lasers." *Studies in Applied Mathematics*, **150** (1) pp. 218–253. DOI: 10.1111/sapm.12538

5. R. Parker, Y. Shen, A. Aceves, and **J. Zweck**. 2022. "Spatiotemporal dynamics in a twisted, circular waveguide array." *Studies in Applied Mathematics*, **149** (2) pp. 537–560. DOI: 10.1111/sapm.12511.

6. V. Shinglot, **J. Zweck**, and C. R. Menyuk. 2022. "The continuous spectrum of periodically-stationary pulses in a stretched pulse laser." *Optics Letters*, **47** (6) pp. 1490-1493. DOI: 10.1364/OL.448477

7. **J. Zweck**, Y. Chen, M. Goeckner, and Y. Shen. 2021. "Spectral computation of low probability tails for the homogeneous Boltzmann equation." *Applied Numerical Mathematics*, **162** (4), pp. 301-317. DOI: 10.1016/j.apnum.2020.12.027

8. **J. Zweck**, Y. Latushkin, J. Marzuola, and C.K.R.T Jones. 2021. "The essential spectrum of periodically-stationary solutions of the complex Ginzburg-Landau equation." *Journal of Evolution Equations*, **21** (3), 3313-3329. DOI 10.1007/s00028-020-00640-8

9. S. Lama, **J. Zweck**, and M. Goeckner. 2020. "A higher-order moment preserving reduction scheme for the stochastic weighted particle method." *SIAM Journal on Scientific Computing*, **42** (5), pp. A2889-A2909. DOI 0.1137/20M1312253

10. A. Safin, **J. Zweck**, and S.E. Minkoff. 2020. "A one-way coupled model for the vibration of tuning fork-based trace gas sensors driven by a thermoacoustic wave." *Applied Physics B*, **126**, (2), Article No. 29, (10 pages).

11. H. Zheng, H. Lin, L. Dong, Y. Liu, P. Patimisco, **J. Zweck**, A. Mozumder, A. Sampaolo, V. Spagnolo, B. Huang, J. Tang, L. Dong, W. Zhu, J. Yu, Z. Chen, and F. Tittel. 2019. "Influence of tuning fork resonance properties on quartz-enhanced photoacoustic spectroscopy performance." *Sensors*, **19**, (18), 3825 (11 pages).

12. C. Contreras, J. Langford, L. Ammann, **J. Zweck**, and B. Marks. 2019. "Performance improvement of measurement association using a system with two 2D sensors and one 3D sensor." *Journal of Advances in Information Fusion*, **14**, (1), pp. 112–128.

13. A. Safin, S. Minkoff, and **J. Zweck**. 2018. "A preconditioned finite element solution of the coupled pressure-temperature equations used to model trace gas sensors." *SIAM J. Scientific Computing*, **40**, (5), pp. B1470–B1493.

14. **J. Zweck** and C.R. Menyuk. 2018. "Computation of the timing jitter, phase jitter, and linewidth of a similariton laser." *Journal of the Optical Society of America, B*, **35** (5), pp. 1200-1210. DOI: 0.1364/JOSAB.35.001200

15. J. Kaderli, **J. Zweck**, A. Safin, and S.E. Minkoff. 2017. "An analytic solution to the coupled pressure-temperature equations for modeling of photoacoustic trace gas sensors." *Journal of Engineering Mathematics*, **103**, pp. 173–193. DOI 10.1007/s10665-016-9867-5

16. **J. Zweck**. 2016. "Analysis of the Methods Used to Reconstruct the Flight Path of Malaysia Airlines Flight 370." *SIAM Review*, **58** (3), pp. 555-574.

17. Y. Shen, **J. Zweck**, S. Wang, and C.R. Menyuk. 2016. "Spectra of Short Pulse Solutions of the Cubic-Quintic Complex Ginzburg Landau Equation near Zero Dispersion." *Studies in Applied Mathematics (Special Issue in Honor of Mark Ablowitz)*, **137**, pp. 238–255.

18. N. Petra, **J. Zweck**, S.E. Minkoff, A.A. Kosterev, and J.H. Doty III. 2011. "Modeling and design optimization of a resonant optothermoacoustic trace gas sensor." *SIAM J. Applied Mathematics*, **71** (1), pp. 309–332.

19. H. Jiao, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2009. "Receiver model for depolarized signal due to polarization-mode dispersion and partially polarized noise due to polarization-dependent loss in an optical fiber communication system." *Journal of Lightwave Technology*, **27** (18), pp. 4124-4315.

20. N. Petra, **J. Zweck**, A.A. Kosterev, S.E. Minkoff, and D. Thomazy. 2009. "Theoretical analysis of a quartz-enhanced photoacoustic spectroscopy sensor." *Applied Physics B: Lasers and Optics*, **94** (4), pp. 673-680.

21. **J. Zweck** and C.R. Menyuk. 2009. "Validity of the additive white Gaussian noise model for quasi-linear long-haul return-to-zero optical fiber communications systems." *Journal of Lightwave Technology*, **27** (16), pp. 3324-3335.

22. S. Zhang, L. Younes, **J. Zweck**, and T. Ratnanather. 2008. "Diffeomorphic surface flows: A novel method of surface evolution." *SIAM Journal on Applied Mathematics*, **68** (3), pp. 806-824.

23. P. Griggio, J. Hu, J. Wen, G. E. Tudury, **J. Zweck**, B. S. Marks, L. Yan, G. M. Carter, and C. R. Menyuk. 2007. "Characterizing pattern dependence in transmitters and receivers for optical communications systems." *Optics Communications*, **272** (1), pp. 107-110.

24. **J. Zweck** and S.E. Minkoff. 2006. "Modeling compensation for optical fiber communication systems." *SIAM Journal on Optimization*, **17** (3), pp. 738–775.

25. H. Xu, B.S. Marks, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2006. "Statistical properties of the DGD in a long-haul optical fiber system with temporally drifting birefringence." *Journal of Lightwave Technology*, **24** (3), pp. 1165–1175.

26. W. Xi, T. Adali, and **J. Zweck**. 2005. "A MAP equalizer for the optical communications channel." *Journal of Lightwave Technology*, **23** (12), pp. 3989–3996.

27. O.V. Sinkin, V.S. Grigoryan, **J. Zweck**, C.R. Menyuk, A. Docherty, and M. Ablowitz. 2005. "Calculation, characterization, and application of the time-shift function in wavelength-division-multiplexed return-to-zero systems." *Optics Letters*, **30** (16), pp. 2056–2058.

28. W. Pellegrini, **J. Zweck**, C.R. Menyuk, and R. Holzlöhner. 2005. "Computation of bit error ratios for a dense WDM system using the noise covariance matrix and multicanonical Monte Carlo methods." *Photonics Technology Letters*, **17** (8), pp. 1644–1646.

29. I.T. Lima Jr., A.O. Lima, Y. Sun, H. Jiao, **J. Zweck**, C.R. Menyuk, and G.M. Carter. 2005. "A receiver model for optical fiber communication systems with arbitrarily polarized noise." *Journal of Lightwave Technology*, **23** (3), pp. 1478–1490.

30. R. Holzlöhner, A. Mahadevan, C.R. Menyuk, J.M. Morris, and **J. Zweck**. 2005. "Evaluation of the very low BER of FEC codes using dual adaptive importance sampling." *IEEE Communications Letters* **9** (2), pp. 163-165.

31. H. Xu, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2004. "Quantitative experimental study of intra-channel nonlinear timing jitter in a 10 Gb/s terrestrial WDM return-to-zero system." *Photonics Technology Letters*, **16** (1), pp. 314–316.

32. **J.W. Zweck** and L.R. Williams. 2004. "Euclidean group invariant computation of stochastic completion fields using shiftable-twistable functions." *Journal of Mathematical Imaging and Vision*, **21**, (2), pp. 135–154.

33. L.R. Williams and **J. Zweck**. 2003. "A rotation and translation invariant discrete saliency network." *Biological Cybernetics*, **88**, (1), pp. 2-10.

34. R. Harvey, B. Lawson (*First Author*), and **J. Zweck**. 2003. "The de Rham-Federer theory of differential characters and character duality." *American Journal of Mathematics*, **125**, (4), pp. 791–847.

35. Y. Sun, I.T. Lima Jr., A.O. Lima, H. Jiao, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "System performance variations due to partially polarized noise in a receiver." *Photonics Technology Letters*, **15** (11), pp. 1648–1650.

36. T. Wanner, B.S. Marks, C.R. Menyuk, and **J. Zweck**. 2003. "Polarization decorrelation in optical fibers with randomly varying elliptical birefringence." *Optics Letters*, **28** (19), pp. 1799-1801.

37. Y. Sun, A.O. Lima, I.T. Lima Jr., **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Statistics of the system performance in a scrambled recirculating loop with PDL and PDG." *Photonics Technology Letters*, **15** (8), pp. 1067–1069.

38. I.T. Lima, Jr., A.O. Lima, **J. Zweck**, and C.R. Menyuk. 2003. "Performance characterization of chirped return-to-zero modulation format using an accurate receiver model." *Photonics Technology Letters*, **15**, (4), pp. 608–610.

39. **J. Zweck** and C.R. Menyuk. 2003. "Reduction of intra-channel four-wave mixing using subchannel multiplexing." *Photonics Technology Letters*, **15**, (2), pp. 323–325.

40. I.T. Lima, Jr., A.O. Lima, **J. Zweck**, and C.R. Menyuk. 2003. "Efficient computation of outage probabilities due to polarization effects in a WDM system using a reduced Stokes model and importance sampling." *Photonics Technology Letters*, **15**, (1), pp. 45–47.

41. O.V. Sinkin, R. Holzlöhner, **J. Zweck**, and C.R. Menyuk. 2003. "Optimization of the split-step Fourier method in modeling optical fiber communications systems." *Journal of Lightwave Technology*, **21**, (1), pp. 61–68.

42. **J. Zweck** and C.R. Menyuk. 2002. "Analysis of four-wave mixing between pulses in high-data-rate quasi-linear subchannel-multiplexed systems." *Optics Letters*, **27**, (14), pp. 1235–1237.

43. O.V. Sinkin, **J. Zweck**, and C.R. Menyuk. 2001. "A comparative study of pulse interactions in optical fiber transmission systems with different modulation formats." *Optics Express*, **9**, (7), pp. 339–352.

44. R. Harvey and **J. Zweck**. 2001. "Divisors and Euler sparks of atomic sections." *Indiana University Mathematics Journal*, **50**, (1), pp. 243–298.

45. **J. Zweck**. 2001. "The Stiefel–Whitney spark". *Houston Journal of Mathematics*, **27**, (2), pp. 325–351.

46. L.R. Williams, **J. Zweck**, T. Wang, and K.K. Thornber. 1999. "Computing stochastic completion fields in linear-time using a resolution pyramid." *Computer Vision and Image Understanding*, **76**, (3), pp. 289-297.

47. R. Harvey and **J. Zweck**. 1998. "Stiefel–Whitney currents." *The Journal of Geometric Analysis*, **8**, (5), pp. 809–844.

48. **J. Zweck**. 1995. "Chern currents of singular connections associated with a section of a compactified bundle." *Indiana University Mathematics Journal*, **44**, pp. 341–384.

49. **J. Zweck**. 1995. "Euler and Pontrjagin currents of a section of a compactified real bundle." *Journal of Differential Geometry and its Applications*, **5** , pp. 277–309.

Articles appearing as chapters in edited volumes

1. C.R. Menyuk, B.S. Marks, I.T. Lima, Jr., **J. Zweck**, Y. Sun, G.M. Carter, and D. Wang. 2002. "Polarization effects in long-haul undersea systems", in *Undersea Fibre Communication Systems*, José Chesnoy, ed., Elsevier Press.

Refereed conference publications or abstracts

1. J. Popa, K. Nezafati, Y. R. Gel, **J. Zweck**, and G. Bobashev. 2016. "Catching Social Butterflies: Identifying Influential Users of an Event-Based Social Networking Service." *IEEE BigData Congress*, Paper #10982.

2. B. Brennan, R.C. Kirby, **J. Zweck**, and S.E. Minkoff. 2013. "High-Performance Python-based Simulations of Pressure and Temperature Waves in a Trace Gas Sensor." *Workshop on Python for High Performance and Scientific Computing, Supercomputing Conference 2013*, pp. 1-10.

3. N. Petra, **J. Zweck**, S.E. Minkoff, A.A. Kosterev, and J.H. Doty III. 2011. "Validation of a Model of a Resonant Optothermoacoustic Trace Gas Sensor", *Conference on Lasers and Electro-Optics*, Baltimore, MD, paper JTuI115 [*poster*].

4. **J. Zweck** and C.R. Menyuk. 2011. "A Chromatic Dispersion Estimation Method for Arbitrary Modulation Formats." *Conference on Lasers and Electro-optics*, Baltimore, MD, paper CThX4.

5. N. Petra, A. A. Kosterev, **J. Zweck**, S. E. Minkoff, and J.H. Doty III. 2010. "Numerical and experimental investigation for a resonant optothermoacoustic sensor." *Conference on Lasers and Electro-Optics*, San Jose, CA, paper CMJ6.

6. V. Veerasubramanian, J. Hu, **J. Zweck**, C. R. Menyuk. 2008. "Propagation analysis of an 80-Gb/s wavelength-converted signal utilizing XPM." *Optical Fiber Communications*, San Diego, CA, paper JWA69, [*poster*].

7. J.T. Ratnanather, L. Younes, **J. Zweck**, L. Wang, M. Hosakere, J.G. Csernansky, and M.I. Miller. 2007. "Statistical analysis of surface roughness via local area maps: Application to the cingulate gyrus in healthy and schizophrenic subjects." *International Congress on Schizophrenia Research*, Colorado Springs, Colorado, paper 99, [*poster*].

8. **J. Zweck** and C.R. Menyuk. 2006. "Detection and mitigation of soft failure due to polarization-mode dispersion in optical networks." *Optical Fiber Communications*, Anaheim, CA, paper OFG5.

9. O.V. Sinkin, V.S. Grigoryan, **J. Zweck** and C.R. Menyuk. 2006. "Calculation of the bit-error ratio in wavelength-division-multiplexed return-to-zero systems when the nonlinear penalty is dominated by collision-induced timing jitter." *Optical Fiber Communications*, Anaheim, CA, paper JThB3.

10. L. Fomundam, **J. Zweck**, H. Xu, H. Jiao, and G.M. Carter. 2006. "Probability density functions of rotations in loop-synchronous polarization scrambling for recirculating loop experiments." *Optical Fiber Communications*, Anaheim, CA, paper OWI16.

11. W. Xi, T. Adali, and **J. Zweck**. 2005. "Electrical estimation of conditional probability for maximum-likelihood based PMD mitigation." *Optical Fiber Communications*, Anaheim, CA, paper OWJ5.

12. A.O. Lima, I.T. Lima Jr., C.R. Menyuk, and **J. Zweck**. 2005. "Performance evaluation of single-section and three-section PMD compensators using extended Monte Carlo methods." *Optical Fiber Communications*, Anaheim, CA, paper OME27.

13. C.R. Menyuk, B.S. Marks, and **J. Zweck**. 2004. "A methodology for calculating performance in an optical fiber communications system." *Optical Communication Theory and Techniques, Proceedings of Tyrrhenian International Workshop on Digital Communications*, E. Forestieri (Ed.), Springer-Verlag, pp. 113–120.

14. H. Xu, B.S. Marks*, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2004. "The long-term distribution of differential group delay in a recirculating loop." *Symposium on Optical Fiber Measurements*, Boulder Colorado, paper V3, pp. 95–98.

15. W. Wang, O.V. Sinkin, T. Adali, **J. Zweck**, and C.R. Menyuk. 2004. "Prior-based line-coding for WDM RZ systems." *Conference on Lasers and Electro-Optics* San Fransisco, CA, paper CFN5.

16. A. Kalra, **J. Zweck**, and C.R. Menyuk. 2004. "Comparison of bit-error ratios for receiver models with integrate-and-dump and realistic electrical filters using the Gaussian approximation." *Conference on Lasers and Electro-Optics* San Fransisco, CA, paper CWA24, [*poster*].

17. W. Xi, T. Adali and **J. Zweck**. 2004. "A MAP equalizer for the optical communications channel." *International Conference on Acoustics, Speech, and Signal Processing*, Montreal, Canada, paper SPCOM-P10, [*poster*].

18. O.V. Sinkin, V.S. Grigoryan, R. Holzlöhner, A. Kalra, **J. Zweck**, and C.R. Menyuk. 2004. "Calculation of error probability in WDM RZ systems in presence of bit-pattern-dependent nonlinearity and of noise." *Optical Fiber Communications*, Los Angeles, CA, paper TuN4.

19. O.V. Sinkin, R. Holzlöhner, V.S. Grigoryan, **J. Zweck**, and C.R. Menyuk. 2003. "Probabilistic description of nonlinear penalties in WDM RZ systems using multicanonical Monte Carlo simulations." *IEEE Lasers and Electro-optics Society (LEOS) Annual Meeting*, Tuscon AZ, paper ThI5.

20. A.O. Lima, I.T. Lima Jr., **J. Zweck**, and C.R. Menyuk. 2003. "Efficient computation of PMD-induced penalties using multicanonical Monte Carlo simulations." *ECOC-IOOC*, Rimini, Italy, paper 507. [*One of winners of the "Venice Summer School on PMD Awards" for student papers on polarization-mode dispersion at ECOC-IOOC 2003*]

21. I.T. Lima Jr., A.O. Lima, **J. Zweck** and C.R. Menyuk. 2003. "An accurate formula for the Q-factor of a fiber transmission system with partially polarized noise." *Conference on Lasers and Electro-Optics*, Baltimore, MD, paper CThJ2.

22. H. Jiao, I.T. Lima Jr., A.O. Lima, Y. Sun, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Experimental validation of a realistic receiver model for systems with unpolarized noise." *Conference on Lasers and Electro-Optics*, Baltimore, MD, paper CThJ1.

23. **J. Zweck**, S.E. Minkoff, A.O. Lima, I.T. Lima, Jr., and C.R. Menyuk. 2003. "A comparative study of feedback controller sensitivity to all orders of PMD for a fixed DGD compensator." *Optical Fiber Communications*, Atlanta, GA, paper ThY2.

24. T. Wanner, B.S. Marks, C.R. Menyuk, and **J. Zweck**. 2003. "Polarization mode dispersion, decorrelation, and diffusion in optical fibers with randomly varying elliptical birefringence." *Optical Fiber Communications*, Atlanta, GA, paper WJ5.

25. O.V. Sinkin, **J. Zweck**, and C.R. Menyuk. 2003. "Effects of the nonlinearly-induced timing and amplitude jitter on the performance of different modulation formats in WDM optical fiber communications systems." *Optical Fiber Communications*, Atlanta, GA, paper TuF5.

26. I.T. Lima Jr., A.O. Lima, **J. Zweck**, and C.R. Menyuk. 2003. "Computation of the Q-factor in optical fiber systems using an accurate receiver model." *Optical Fiber Communications*, Atlanta, GA, paper MF81.

27. W. Xi, T. Adali, A.O. Lima, W. Wang, **J. Zweck**, and C.R. Menyuk. 2003. "Electrical estimation of polarization mode dispersion parameters for compensation." *Optical Fiber Communications*, Atlanta, GA, paper TuO5.

28. H. Xu, J. Wen, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "The effects of distributed PMD, PDL, and loop scrambling on BER distributions in a recirculating loop used to emulate a long-haul terrestrial transmission." *Optical Fiber Communications*, Atlanta, GA, paper TuO2.

29. H. Xu, H. Jiao, J. Wen, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Quantitative experimental study of intra-channel nonlinear timing jitter in a 10 Gb/s terrestrial WDM return-to-zero system." *Optical Fiber Communications*, Atlanta, GA, paper FE7.

30. Y. Sun, I.T. Lima Jr., A.O. Lima, H. Jiao, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Effects of partially polarized noise in a receiver." *Optical Fiber Communications*, Atlanta, GA, paper MF82.

31. Y. Sun, A.O. Lima, I.T. Lima Jr., L. Yan, **J. Zweck**, C.R. Menyuk, and G.M. Carter. 2003. "Accurate Q-factor distributions in optical transmission systems with polarization effects." *Optical Fiber Communications*, Atlanta, GA, paper ThJ4.

32. **J. Zweck**, I.T. Lima, Jr., R. Holzlöhner, and C.R. Menyuk. 2002. "New advances in modeling optical fiber communication systems." *Optical Society of America Integrated Photonics Research (Technical Digest)*, paper IThB1, Vancouver, Canada.

33. I.T. Lima, Jr., A.O. Lima, Y. Sun, **J. Zweck**, B.S. Marks, G.M. Carter, and C.R. Menyuk. 2002. "Computation of the outage probability due to the polarization effects using importance sampling." *Optical Fiber Communications*, Anaheim, CA, paper TuI7.

34. **J. Zweck** and C.R. Menyuk. 2002. "Reduction of intra-channel four-wave mixing using subcarrier multiplexing." *Optical Fiber Communications*, Anaheim, CA, paper ThGG9.

35. L.R. Williams and **J. Zweck**. 2002. "A rotation and translation invariant discrete saliency network." *Advances in Neural Information Processing Systems 14*, MIT Press. [*Full Oral Presentation*]

36. O.V. Sinkin, **J. Zweck**, and C.R. Menyuk. 2001. "A comparative study of pulse interactions in optical fiber transmission systems with different modulation formats." *IEEE Lasers and Electro-Optics Society Annual Meeting*, La Jolla, CA, paper TuK2. [*Winner of IEEE-LEOS Best Student Paper Award*]

37. **J. Zweck** and L.R. Williams. 2000. "Euclidean group invariant computation of stochastic completion fields using shiftable-twistable functions." *Proc. of the 6th European Conference on Computer Vision, Part II*, Dublin, Ireland, Lecture Notes in Computer Science, **1843**, pp. 100–116, Springer-Verlag.

Unrefereed publications

1. **J. Zweck**. 2014. "How did Inmarsat deduce possible flight paths for MH370?" *SIAM News*, **47**, May, pp. 1,8.

2. **J. Zweck**, I.T. Lima, Jr., Y. Sun, A.O. Lima, C.R. Menyuk, and G.M. Carter. 2003. "Modeling recievers in optical communication systems with polarization effects." *Optics and Photonics News*, November, pp. 30–35.

3. **J. Zweck** and L.R. Williams. 2000. "A wavelet basis for Euclidean invariant computation of visual contours." *SIAM News, Applications on Advanced Architecture Computers Column*, **33** (3).

4. **J. Zweck** and L.R. Williams. 2000. "Euclidean invariant computation of stochastic completion fields using shiftable-twistable wavelets." *Applications of High Performance Computing in Engineering VI*, Ingber, Power, and Brebbia (Eds.), WIT Press.

PRESENTATIONS

Invited talks at professional meetings, seminars, or colloquia

1. **J. Zweck**. 2025. "Modeling and stability of short pulse lasers." *CDS Seminar, Brookhaven National Lab*, May 28.

2. **J. Zweck**. 2024. "Recent results and open problems in the spectral theory of short pulse fiber lasers." *IMPRESS-U Workshop, Banach Center, Institute of Mathematics at the Polish Academy of Sciences*, Sep 17-20.

3. **J. Zweck**. 2022. "Modeling and stability of short pulse lasers." *Department of Mathematical Sciences, UT Dallas*, April 22nd.

4. **J. Zweck**. 2021. "The essential spectrum of periodically stationary pulses in femtosecond fiber lasers", *Computational and Applied Mathematics Seminar, Department of Mathematics, University of Kansas*, Mar 17.

5. **J. Zweck**. 2016. "A Diffeomorphic Mean Curvature Flow for the Processing of Anatomical Surfaces." *Department of Radiation Oncology, UT Southwestern Medical Center*, Apr 1.

6. **J. Zweck**. 2015. "Spectra of Short Pulse Solutions of the Cubic-Quintic Complex Ginzburg Landau Equation near Zero Dispersion." *Department of Mathematics, UT Arlington*, Sept 11th.

7. **J. Zweck**. 2014. "An Analysis of the Methods Used to Predict the Flight Path of Malaysia Airlines Flight 370." *Department of Mathematics, Texas A&M Commerce*, Nov 3rd.

8. **J. Zweck**. 2014. "A Preliminary Analysis of the Mathematical Method Used to Determine the Flight Path of the Missing Malaysian Airliner." *Department of Mathematics, University of New Mexico*, May 15.

9. **J. Zweck**. 2014. "How Satellite Engineers are Using Math to Deduce the Flight Path of the Missing Malaysian Airliner." *Department of Mathematical Sciences, University of Texas at Dallas*, Apr 4th.

10. **J. Zweck**. 2013. "Modeling and Algorithms for Optical Fiber Systems." *Department of Mathematics, Southern Methodist University*, Oct 10th.

11. **J. Zweck**. 2013. "A Diffeomorphic Mean Curvature Flow for the Processing of Anatomical Surfaces." *Department of Mathematics, Texas Christian University*, Mar 8th.

12. **J. Zweck**. 2012. "Diffeomorphic Flows for Computational Anatomy and Performance Quantification for Optical Systems." *Department of Mathematical Sciences, University of Texas at Dallas*, May 10.

13. **J. Zweck**. 2010. "A receiver model for optical communications systems with polarization effects." *Electrical Engineering Graduate Seminar, UMBC*, Feb. 26.

14. **J. Zweck**. 2007. "A diffeomorphic mean curvature flow for the processing of anatomical surfaces." *Department of Mathematics and Statistics, University of Maryland Baltimore County*, Sept. 14th.

15. **J. Zweck**. 2007. "Curvature-driven diffeomorphic flows of surfaces", *GADGET Seminar, Department of Mathematics, University of Texas at Austin*, Mar. 27th.

16. **J. Zweck** and S.E. Minkoff. 2006. "Optimization of polarization-mode dispersion compensators in optical fiber communications." *Conference on Nonlinearity and Randomness in Complex Systems*, SUNY Buffalo, NY, March 31 – April 2.

17. C.R. Menyuk, B.S. Marks, and **J. Zweck**. 2004. "A methodology for calculating performance in an optical fiber communications system." *Tyrrhenian International Workshop on Digital Communications* Pisa Italy, October 17-18.

18. **J. Zweck**. 2004. "Applications of multicanonical Monte Carlo sampling to nonlinear optical communications systems." *Electrical Engineering Graduate Seminar, UMBC*, Oct. 8.

19. **J. Zweck**. 2004. "Numerical and statistical challenges in comparative studies of brain surface curvatures." *South East Geometry Conference*, University of Georgia, Athens, GA, March 20.

20. **J. Zweck**. 2003. "Euclidean invariant computation of salient closed contours in images." *Numerical Analysis Seminar, Department of Mathematics, University of Maryland, College Park*, Sept. 23.

21. **J. Zweck**. 2003. "Modeling, analysis and simulation of fiber optic communication systems." *Department of Mathematics, United States Naval Academy*, Feb. 24th.

22. **J. Zweck**. 2003. "Modeling, analysis and simulation of fiber optic communication systems." *Department of Mathematics and Statistics, University of Maryland Baltimore County*, Feb. 5th.

23. **J. Zweck**, I.T. Lima, Jr., R. Holzlöhner, and C.R. Menyuk. 2002. "New advances in modeling optical fiber communication systems." *Optical Society of America Integrated Photonics Research*, Vancouver, Canada, July 17–19.

24. **J. Zweck**. 2000. "Euclidean invariant contour completion using shiftable-twistable functions." *UMBC; University of North Texas; Texas Christian University; Portland State University; Connecticut College*, March–May.

25. **J. Zweck**. 2000. "Euclidean invariant contour completion using shiftable-twistable functions." *Computer Vision Seminar, Department of Computer Science, University of Maryland, College Park*, March.

26. **J. Zweck**. 1999. "Euclidean group invariant computation of stochastic completion fields in a steerable-shiftable wavelet basis." *NEC Research Institute*, Jun. 21.

27. **J. Zweck**. 1999. "A biologically plausible Euclidean invariant solution of the illusory contour problem in human and computer vision." *Dept of Mathematics and Computer Science, Metropolitan State College of Denver*, Apr. 18.

28. **J. Zweck**. 1999. "Euclidean invariant contour completion using shiftable-twistable functions." *Vision Seminar, Computer Science Department, Yale University*, Dec. 8th.

29. **J. Zweck**. 1999. "Euclidean invariant contour completion using shiftable-twistable functions." *Applied Mathematics Pattern Theory and Vision Seminar, Brown University*, Dec. 1st.

30. **J. Zweck**. 1999. "Euclidean invariant computation in human vision using wavelets to solve a Fokker-Planck equation." *Department of Mathematics, University of New Mexico*, Nov. 4.

31. **J. Zweck**. 1999. "Computing visual contours in a Euclidean invariant manner using wavelets." *Albuquerque High Performance Computing Center*, Oct. 27.

32. **J. Zweck**. 1997. "The theory of primary and secondary characteristic currents", *Department of Mathematics, University of New Mexico*, Nov. 14.

33. **J. Zweck**. 1997. "Secondary characteristic currents." *Special Session on Geometric Analysis, American Mathematical Society Meeting*, Corvallis, Oregon, Apr. 19.

34. **J. Zweck**. 1996. "Characteristic currents of vector bundle maps." *University of Texas at Austin*, Sept. 4.

35. **J. Zweck**. 1996. "Stiefel–Whitney currents." *Department of Mathematics University of Georgia*, Nov. 1.

36. **J. Zweck**. 1995. "The theory of characteristic currents." *Department of Mathematics, University of Houston*, Apr. 14.

37. **J. Zweck**. 1995. "Forms, currents and the local Gauss-Bonnet theorem." *Department of Mathematics, University of Nevada Reno*, Apr. 3.

38. **J. Zweck**. 1994. "Compactification problems in the theory of characteristic currents." *Department of Mathematics, Brown University*, Feb. 10.

39. **J. Zweck**. 1994. "Characteristic currents, divisors and singular connections." *Department of Mathematics, University of Georgia*, Jan. 6.

40. **J. Zweck**. 1993. "Characteristic currents of singular connections associated with a compactified bundle." *Differential Geometry Workshop, University of Adelaide, Australia*, Jun. 30.

41. **J. Zweck**. 1993. "Chern currents of singular connections associated with a compactified bundle." *Texas Topology and Geometry Conference*, Rice University, Apr. 17.

Referred talks at professional meetings

1. J. Popa, K. Nezafati, Y. R. Gel, **J. Zweck**, and G. Bobashev. 2016. "Catching Social Butterflies: Identifying Influential Users of an Event-Based Social Networking Service." *IEEE BigData Congress*, San Francisco, CA, June 30.

2. B. Brennan, R.C. Kirby, **J. Zweck**, and S.E. Minkoff. 2013. "High-Performance Python-based Simulations of Pressure and Temperature Waves in a Trace Gas Sensor." *Workshop Python for High Performance and Scientific Computing, Supercomputing Conference*, Denver, CO, Nov 18.

3. N. Petra, **J. Zweck**, S.E. Minkoff, A.A. Kosterev, and J.H. Doty III. 2011. "Validation of a Model of a Resonant Optothermoacoustic Trace Gas Sensor", *Conference on Lasers and Electro-Optics*, Baltimore, MD, May 3, paper JTuI115 [*poster*].

4. **J. Zweck** and C.R. Menyuk. 2011. "A Chromatic Dispersion Estimation Method for Arbitrary Modulation Formats." *Conference on Lasers and Electro-optics*, Baltimore, MD, May 5, paper CThX4.

5. N. Petra, A. A. Kosterev, **J. Zweck**, S. E. Minkoff, and J.H. Doty III. 2010. "Numerical and experimental investigation for a resonant optothermoacoustic sensor." *Conference on Lasers and Electro-Optics* San Jose, CA, May 16-21, paper CMJ6.

6. V. Veerasubramanian, J. Hu, **J. Zweck**, C. R. Menyuk. 2008. "Propagation analysis of an 80-Gb/s wavelength-converted signal utilizing XPM." *Optical Fiber Communications*, San Diego, CA, February 24-28, paper JWA69 [*poster*].

7. J.T. Ratnanather, L. Younes, **J. Zweck**, L. Wang, M. Hosakere, J.G. Csernansky, and M.I. Miller. 2007. "Statistical analysis of surface roughness via local area maps: Application to the cingulate gyrus in healthy and schizophrenic subjects." *International Congress on Schizophrenia Research*, Colorado Springs, Colorado, March 28 - April 1, paper 99 [*poster*].

8. **J. Zweck** and C.R. Menyuk. 2006. "Detection and mitigation of soft failure due to polarization-mode dispersion in optical networks." *Optical Fiber Communications*, Anaheim, CA, March 7-9, paper OFG5.

9. O.V. Sinkin, V.S. Grigoryan, **J. Zweck** and C.R. Menyuk. 2006. "Calculation of the bit-error ratio in wavelength-division-multiplexed return-to-zero systems when the nonlinear penalty is dominated by collision-induced timing jitter." *Optical Fiber Communications*, Anaheim, CA, March 7-9, paper JThB3 [*poster*].

10. L. Fomundam, **J. Zweck**, H. Xu, H. Jiao, and G.M. Carter. 2006. "Probability density functions of rotations in loop-synchronous polarization scrambling for recirculating loop experiments." *Optical Fiber Communications*, Anaheim, CA, March 7-9, paper OWI16 [*poster*].

11. W. Xi, T. Adali, and **J. Zweck**. 2005. "Electrical estimation of conditional probability for maximum-likelihood based PMD mitigation." *Optical Fiber Communications*, Anaheim, CA, March 6-11, paper OWJ5.

12. A.O. Lima, I.T. Lima Jr., C.R. Menyuk and **J. Zweck**. 2005. "Performance evaluation of single-section and three-section PMD compensators using extended Monte Carlo methods." *Optical Fiber Communications*, Anaheim, CA, March 6-11, paper OME27 [*poster*].

13. H. Xu, B.S. Marks, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2004. "The long-term distribution of differential group delay in a recirculating loop." *Symposium on optical fiber measurements*, Boulder, Colorado, Wed Sept 29th, Session V, Talk 3.

14. W. Wang, O.V. Sinkin, T. Adali, **J. Zweck**, and C.R. Menyuk. 2004. "Prior-based line-coding for WDM RZ systems." *Conference on Lasers and Electro-Optics* San Fransisco, CA, May 16–21, paper CFN5.

15. A. Kalra, **J. Zweck** and C.R. Menyuk. 2004. "Comparison of bit-error ratios for receiver models with integrate-and-dump and realistic electrical filters using

the Gaussian approximation." *Conference on Lasers and Electro-Optics* San Fransisco, CA, May 16–21, paper CWA24, [*poster*].

16. W. Xi, T. Adali, and **J. Zweck**. 2004. "A MAP equalizer for the optical communications channel." *International Conference on Acoustics, Speech, and Signal Processing*, Montreal, Canada, May 17–21, paper SPCOM-P10, [*poster*].

17. O.V. Sinkin, V.S. Grigoryan, R. Holzlöhner, A. Kalra, **J. Zweck**, and C.R. Menyuk. 2004. "Calculation of error probability in WDM RZ systems in presence of bit-pattern-dependent nonlinearity and of noise." *Optical Fiber Communications*, Los Angeles, CA, Feb. 22–27.

18. O.V. Sinkin, R. Holzlöhner, V.S. Grigoryan, **J. Zweck**, and C.R. Menyuk. 2003. "Probabilistic description of nonlinear penalties in WDM RZ systems using multicanonical Monte Carlo simulations." *IEEE Lasers and Electro-optics Society (LEOS) Annual Meeting*, Tuscon AZ, Oct. 26–30.

19. A.O. Lima, I.T. Lima Jr., **J. Zweck**, and C.R. Menyuk. 2003. "Efficient computation of PMD-induced penalties using multicanonical Monte Carlo simulations." *ECOC-IOOC 2003*, Rimini, Italy, Sept. 21–25.

20. I.T. Lima Jr., A.O. Lima, **J. Zweck**, and C.R. Menyuk. 2003. "An accurate formula for the Q-factor of a fiber transmission system with partially polarized noise." *Conference on Lasers and Electro-Optics*, Baltimore, MD, June 1–6.

21. H. Jiao, I.T. Lima Jr., A.O. Lima, Y. Sun, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Experimental validation of a realistic receiver model for systems with unpolarized noise." *Conference on Lasers and Electro-Optics*, Baltimore, MD, June 1–6.

22. **J. Zweck**, S.E. Minkoff, A.O. Lima, I.T. Lima, Jr., and C.R. Menyuk. 2003. "A comparative study of feedback controller sensitivity to all orders of PMD for a fixed DGD compensator." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

23. T. Wanner, B.S. Marks, C.R. Menyuk, and **J. Zweck**. 2003. "Polarization mode dispersion, decorrelation, and diffusion in optical fibers with randomly varying elliptical birefringence." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

24. O.V. Sinkin, **J. Zweck**, and C.R. Menyuk. 2003. "Effects of the nonlinearly-induced timing and amplitude jitter on the performance of different modulation formats in WDM optical fiber communications systems." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

25. I.T. Lima Jr., A.O. Lima, **J. Zweck**, and C.R. Menyuk. 2003. "Computation of the Q-factor in optical fiber systems using an accurate receiver model." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

26. W. Xi, T. Adali, A.O. Lima, W. Wang, **J. Zweck**, and C.R. Menyuk. 2003. "Electrical estimation of polarization mode dispersion parameters for compensation." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

27. H. Xu, J. Wen, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "The effects of distributed PMD, PDL, and loop scrambling on BER distributions in a recirculating loop used to emulate a long-haul terrestrial transmission." *Optical Fiber Communications* , Atlanta, GA, March 22–27.

28. H. Xu, H. Jiao, J. Wen, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Quantitative experimental study of intra-channel nonlinear timing jitter in a 10 Gb/s terrestrial WDM return-to-zero system." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

29. Y. Sun, I.T. Lima Jr., A.O. Lima, H. Jiao, **J. Zweck**, L. Yan, C.R. Menyuk, and G.M. Carter. 2003. "Effects of partially polarized noise in a receiver." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

30. Y. Sun, A.O. Lima, I.T. Lima Jr., L. Yan, **J. Zweck**, C.R. Menyuk, and G.M. Carter. 2003. "Accurate Q-factor distributions in optical transmission systems with polarization effects." *Optical Fiber Communications*, Atlanta, GA, March 22–27.

31. I.T. Lima, Jr., A.O. Lima, Y. Sun, **J. Zweck**, B.S. Marks, G.M. Carter, and C.R. Menyuk. 2002. "Computation of the outage probability due to the polarization effects using importance sampling.", *Optical Fiber Communications*, Anaheim, CA, Mar. 17–22.

32. **J. Zweck** and C.R. Menyuk. 2002. "Reduction of intra-channel four-wave mixing using subcarrier multiplexing." *Optical Fiber Communications*, Anaheim, CA, Mar. 17–22, [*Poster*].

33. L.R. Williams and **J. Zweck**. 2001. "A rotation and translation invariant discrete saliency network." *Advances in Neural Information Processing Systems 14*, Vancouver, Canada, Dec. 3–8, [*Full Oral Presentation*].

34. O.V. Sinkin, **J. Zweck**, and C.R. Menyuk. 2001. "A comparative study of pulse interactions in optical fiber transmission systems with different modulation formats." *IEEE Lasers and Electro-Optics Society Annual Meeting*, La Jolla, CA, paper TuK2, November 12-15, [*Winner of IEEE-LEOS Best Student Paper Award*].

35. L.R. Williams and **J. Zweck**. 2000. "Euclidean group invariant computation of stochastic completion fields using shiftable-twistable functions." *European Conference on Computer Vision*, Dublin, Ireland, June 26 – July 1.

36. L.R. Williams and **J. Zweck**. 1999. "A wavelet basis for Euclidean group invariant computation of stochastic completion fields." *Learning Workshop*, Snowbird, Utah, April 6–9.

Contributed talks at professional meetings

1. E. Gallo, **J. Zweck** and Y. Latushkin. 2025. "Numerical Approximation of Fredholm Determinants of the Complex Ginzburg-Landau Equation." *8th Annual Meeting of the SIAM Texas-Louisiana Section*, University of Texas at Austin, Austin, TX, Sep. 26-28.

2. **J. Zweck**, E, Gallo, and Y. Latushkin. 2025. "Spectral stability via the Fredholm determinant of a trace class Birman-Schwinger operator." *The 13th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, University of Georgia, Athens, GA, Apr. 14-16.

3. **J. Zweck**, E, Gallo, and Y. Latushkin. 2024. "Spectral stability via the Fredholm determinant of a trace class Birman-Schwinger operator." *7th Annual Meeting of the SIAM Texas-Louisiana Section*, Baylor University, Waco, TX, Oct. 11-13.

4. **J. Zweck**, E, Gallo, and Y. Latushkin. 2024. "Spectral stability via the Fredholm determinant of a trace class Birman-Schwinger operator." *SIAM Conference on Nonlinear Waves and Coherent Structures*, Baltimore, MD, June 24-27.

5. **J. Zweck** and V. Shinglot. 2023. "A split-step method for a nonlinear nonlocal wave equation with applications to laser stability." *6th Annual Meeting of the SIAM Texas-Louisiana Section*, University of Louisiana, Lafayette, LA, Nov. 3-5.

6. E. Gallo, **J. Zweck**, and Y. Latushkin. 2022. "Stability of Ginzburg-Landau solitons via Fredholm determinants of a Green's operator." *5th Annual Meeting of the SIAM Texas-Louisiana Section*, University of Houston, Houston, TX, Nov. 4-6.

7. **J. Zweck**, E. Gallo and Y. Latushkin. 2022. "Stability of stationary Ginzburg-Landau pulses via Fredholm determinants of Birman-Schwinger operators." *Waves2022, The Twelfth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, University of Georgia, Athens, GA, Mar 30-Apr 1.

8. V. Shinglot, **J. Zweck**, Y. Latushkin and C.R. Menyuk. 2022. "Computation and Stability Analysis of Periodically Stationary Pulses in a Short Pulse Laser." *Waves2022, The Twelfth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, University of Georgia, Athens, GA, Mar 30-Apr 1.

9. **J. Zweck**, V. Shinglot, Y. Latushkin and C.R. Menyuk. 2021. "The essential spectrum of breathing pulses in a femtosecond laser", *4th Annual Meeting of the SIAM Texas-Louisiana Section*, Nov 5-7, UTRGV, South Padre Island, Texas [*poster*].

10. **J. Zweck**, V. Shinglot, Y. Latushkin and C.R. Menyuk. 2021. "The essential spectrum of breathing pulses in a femtosecond laser." *SIAM Southeastern Atlantic Section Conference*, Auburn University, MS5, Sep 18-19.

11. **J. Zweck**, Y. Latushkin, J.L. Marzuola, and C.K.R.T. Jones. 2021. "The essential spectrum of periodically stationary solutions of the complex Ginzburg-Landau equation." *SIAM Conference on Applications of Dynamical Systems (DS21)*, Virtual format, MS 32, May 23-27.

12. V. Shinglot and **J. Zweck**. 2021. "A Parameter Continuation Study for Periodically Stationary Pulses in a Mode-Locked Fiber Laser." *SIAM Conference on Applications of Dynamical Systems (DS21)*, Virtual format, MS 15, May 23-27.

13. **J. Zweck**, Y. Chen, M. Goeckner, and Y. Shen. 2021. "Spectral Computation of Low Probability Tails for the Homogeneous Boltzmann Equation." *SIAM Conference of Computational Science and Engineering (CSE21)*, Poster Session, Virtual format, Mar 1-5, *Best Blitz Award*.

14. V. Shinglot, **J. Zweck** and C.R. Menyuk. 2021. "Discovery and stability analysis of periodically stationary pulses in a mode-locked fiber laser." *SIAM Conference of Computational Science and Engineering (CSE21)*, Poster Session, Virtual format, Mar 1-5.

15. A. Mozumder, **J. Zweck**, S.Minkoff and A.Safin. 2020. "A two-way coupled model for viscous damping of a vibrating structure with visco-thermo-acoustic forcing." *3rd Annual SIAM Texas-Louisiana Section Conference*, Poster Session, Virtual Zoom Meeting hosted by Texas A&M University, Oct 16-18.

16. V. Shinglot, **J. Zweck** and C.R. Menyuk. 2020. "Periodically stationary pulses in a lumped fiber laser model via optimization of a Poincaré map functional." *3rd Annual SIAM Texas-Louisiana Section Conference*, Poster Session, , Virtual Zoom Meeting hosted by Texas A&M University, Oct 16-18.

17. S. Lama, **J. Zweck**, and M. Goeckner. 2020. "A group formation technique and the rate of convergence of the stochastic weighted particle method." *3rd Annual SIAM Texas-Louisiana Section Conference*, Poster Session, Virtual Zoom Meeting hosted by Texas A&M University, Oct 16-18.

18. **J. Zweck**, C. Jones, Y. Latushkin, and J. Marzuola. 2019. "The essential spectrum of periodically-stationary solutions of the complex Ginzburg-Landau equation." *2nd Annual SIAM Texas-Louisiana Section Conference*, Southern Methodist University, Dallas, TX, Nov 1-3.

19. S. Lama, **J. Zweck**, and M, Goeckner. 2019. "A particle reduction scheme for the stochastic weighted particle method." *2nd Annual SIAM Texas-Louisiana Section Conference*, Poster Session, Southern Methodist University, Dallas, TX, Nov 1-3.

20. A. Mozumder, **J. Zweck**, and S. Minkoff. 2019. "An analytical solution of a model for visco-thermo-acoustic forcing of a vibrating structure." *2nd Annual SIAM Texas-Louisiana Section Conference*, Poster Session, Southern Methodist University, Dallas, TX, Nov 1-3.

21. V. Shinglot and **J. Zweck**. 2019. "Discovering Periodically-stationary Pulses by Optimizing a Poincare Map Functional." *2nd Annual SIAM Texas-Louisiana Section Conference*, Poster Session, Southern Methodist University, Dallas, TX, Nov 1-3.

22. V. Shinglot, **J. Zweck**, C.R. Menyuk, and Y. Shen. 2018. "Dynamics and noise performance of periodically-stationary pulses." *1st Annual SIAM Texas-Louisiana Section Conference*, Poster Session, Louisiana State University, Baton Rouge, LA, Oct 5-7.

23. V. Shinglot, **J. Zweck**, C.R. Menyuk, and Y. Shen. 2018. "Dynamics and noise performance of periodically-stationary pulses in fiber lasers." *SIAM Conference on Nonlinear Waves and Coherent Structures*, MS31, Anaheim, CA, Jun 11-14.

24. A. Safin, S. Minkoff, and **J. Zweck**. 2018. "Using deal.II and PETSc packages to solve multi-physics problems for trace gas sensor modeling." *The 9th Annual Scientific Software Days Conference*, Austin, TX, April 26-27.

25. A. Safin, **J. Zweck**, and S. Minkoff. 2017. "A preconditioning scheme for finite element solution of the coupled pressure-temperature equations used for modeling trace gas sensors." *International Conference on Preconditioning Techniques for Scientific and Industrial Applications*, Vancouver, CA, July 31-Aug 2.

26. C. Contreras, J. Langford, L. Ammann, and **J. Zweck**. 2017. "A Three-Sensor Assignment Method for Multiple Target Tracking." *SIAM Annual Meeting*, Pittsburgh, PA, June 10-14, [*Poster*].

27. A. Safin, **J. Zweck**, and S. Minkoff. 2017. "Accurate finite element solution of the fully coupled thermoacoustic equations for modeling of trace gas sensors." *SIAM Conference on Computational Science and Engineering*, Atlanta, GA, MS 253, Feb 27-Mar 3.

28. S. Minkoff and **J. Zweck**. 2016. "UTD's EDT Program: Team Training Mathematical Scientists Through Industrial Collaborations." *SIAM Conference on Applied Mathematics Education*, Philadelphia, PA, Sep 30-Oct 2.

29. **J. Zweck**. 2016. "Developing Geometric Imagination With the Aid of 3D Printed Models." *SIAM Conference on Applied Mathematics Education*, Philadelphia, PA, Sep 30-Oct 2.

30. **J. Zweck**, Y. Shen, S. Wang, and C.R. Menyuk. 2016. "Spectra of Short Pulse Solutions of the Cubic-Quintic Complex Ginzburg Landau Equation near Zero Dispersion." *SIAM Conference on Nonlinear Waves and Coherent Structures*, Philadelphia, PA, Aug. 8-11.

31. Y. Shen,, **J. Zweck**, S. Wang, and C.R. Menyuk. 2016. "Spectra of Short Pulse Solutions of the Cubic-Quintic Complex Ginzburg Landau Equation Near Zero Dispersion." *SIAM Annual Meeting*, Boston, MA, July 11-15, 2016 [*Electronic Poster*].

32. J. Popa, **J. Zweck**, Y. Gel, and K. Nezafati. 2016. "Inferring Offline Social Networks from Online Data." *SIAM Annual Meeting*, Boston, MA, July 11-15.

33. Y. Shen and **J. Zweck**. 2015. "Numerical Analysis of the Spectrum of Short Pulse Solutions of the Cubic-Quintic Ginzburg Landau Equation near Zero Dispersion." *The Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, GA, April 1-4.

34. Y. Chen, Y. Shen, **J. Zweck**, and M. Goeckner. 2015. "Boltzmann Collision Operator for Cylindrically Symmetric Velocity Distributions in Plasmas." *SIAM Conference on Computational Science and Engineering, Salt Lake City Utah, March 14-18*, CSE Methods Session, PP6, [*Poster*].

35. **J. Zweck** and C.R. Menyuk. 2013. "Minimization of Timing Jitter near Zero-Average Dispersion in an Amplifier Similariton Fiber Laser." *The Eighth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, GA, March 25-28 [*Poster*].

36. **J. Zweck** and C.R. Menyuk. 2012. "Dynamics and Noise Minimization of Femto-Second Similariton Pulses in a Fiber Laser with Zero Average Dispersion." *SIAM Annual Meeting*, Minneapolis, MN, July 9-13, [*Poster*].

37. M. Barouti, N. Petra, **J. Zweck**, S.E. Minkoff, A.A. Kosterev, J.H. Doty III, and F.K. Tittel. 2012. "Modeling and Optimization of QEPAS sensors." *NSF MIRTHE Site Visit Review*, Princeton University, Mar. 20, [*poster*].

38. **J. Zweck** and C.R. Menyuk. 2010. "Dynamics and timing jitter of a Ytterbium fiber laser." *SIAM Conference on Nonlinear Waves and Coherent Structures*, Philadelphia, PA, Aug. 16-19.

39. **J. Zweck**, S. Zhang, L. Younes, and T. Ratnanather. 2010. "A diffeomorphic mean curvature flow for the processing of anatomical surfaces." *SIAM Annual Meeting*, Pittsburgh, PA, July 12-16, [*Poster*].

40. N. Petra, **J. Zweck**, S.E. Minkoff, and A.A. Kosterev. 2009. "Theoretical analysis of an optothermoacoustic sensor." *MIRTHE Summer Workshop*, New York City, August 5, [*poster*].

41. N. Petra, **J. Zweck**, and S.E. Minkoff. 2009. "Application of BEM in Photoacoustic Spectroscopy." *SIAM Annual Meeting*, Denver, CO, July 9.

42. N. Petra, **J. Zweck**, S.E. Minkoff, and A.A. Kosterev. 2009. "Models of QEPAS and ROTADE sensors." *NSF MIRTHE Site Visit Review*, Princeton University, Feb. 4, [*poster*].

43. N. Petra, **J. Zweck**, S.E. Minkoff, and A.A. Kosterev. 2008. "Theoretical Analysis of a Quartz-Enhanced Photoacoustic Spectroscopy Sensor." *MIRTHE Summer Workshop*, Baltimore, August 6, [*poster*].

44. N. Petra, **J. Zweck**, S.E. Minkoff, and A.A. Kosterev. 2008. "Theoretical Analysis of a Quartz-Enhanced Photoacoustic Spectroscopy Sensor." *NSF MIRTHE Site Visit Review*, Princeton University, Jan. 30, [*poster*].

45. N. Zakarias, S.E. Minkoff, and **J. Zweck**. 2007. "Computational Modeling of Quartz-Enhanced Photoacoustic Spectroscopy (QEPAS) Sensors." *SIAM Conference on Mathematics for Industry*, Philadelphia, PA, October 9-11.

46. N. Petra, **J. Zweck**, S.E. Minkoff, and A.A. Kosterev. 2007. "Computational Modeling of QEPAS." *MIRTHE Summer Workshop*, Princeton University, August 6-10, [*poster*].

47. N. Petra, **J. Zweck**, S.E. Minkoff, and A.A. Kosterev. 2006. "Computational Modeling of QEPAS." *NSF-ERC MIRTHE Start-up Site Visit Review*, Princeton University, Nov. 14-15, [*poster*].

48. **J. Zweck**, W. Pellegrini, C.R. Menyuk, and R. Holzlöhner. 2005. "Deterministic and Stochastic Methods for Computing the Bit Error Ratio in an Optical Fiber Communication System." *The Fourth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, GA, April 11-14.

49. **J.W. Zweck**, O. Sinkin, W. Pellegrini, and C. Menyuk. 2004. "Applications of Multicanonical Monte Carlo Sampling to Nonlinear Optical Communications Systems." *First SIAM Nonlinear Waves and Coherent Structures*, Orlando, FL, MS2, paper 4, October 2–5.

50. **J. Zweck**. 2004. "Numerical and statistical challenges in comparative studies of brain surface curvatures." *Institute for Pure and Applied Mathematics, Graduate Summer School: Mathematics in Brain Imaging*, UCLA July 12 - 23, [*Impromptu 10 minute talk*].

51. C.R. Menyuk, B.S. Marks, **J. Zweck**, A.O. Lima, J. Hu, A. Kalra, A. Onuorah, O.V. Sinkin, Y. Sun. 2004. "*Short Course*: Advances in modeling high data rate optical fiber communications systems." *Optical Fiber Communications*, Los Angeles, CA, Feb. 22–27.

52. **J. Zweck** and L.R. Williams. 2003. "Euclidean Invariant Computation of Salient Closed Contours in Images." *SIAM Annual Meeting, Montreal Canada*, June 16.

53. C.R. Menyuk, V.S. Grigoryan, R.-M. Mu, D. Wang, T. Yu, I.T. Lima, Jr., **J. Zweck**, B.S. Marks, J. Maloney, and Q. Zhang. 2002 and 2003. "*Short Course*: Modeling high-data-rate optical fiber communications systems." *Optical Fiber Communications*, Atlanta, GA, Mar. 22–27, 2003; *Optical Fiber Communications*, Anaheim, CA, Mar. 17–22, 2002.

54. **J. Zweck** and C.R. Menyuk. 2002. "Mitigation of nonlinear impairments in high-data-rate optical fiber communication systems." *SIAM 50th Anniversary and 2002 Annual Meeting*, Philadelphia, PA, July 8–12.

55. **J. Zweck** and C.R. Menyuk. 2001. "Reduction of nonlinear effects in optical fiber communications systems." *Southeast Conference on Applied Mathematics*, North Carolina State University, November 9–11.

56. L.R. Williams and **J. Zweck**. 2002. "Euclidean invariant computation of stochastic completion fields using shiftable-twistable wavelets." *Sixth International Conference on Applications of High-Performance Computing in Engineering*, Maui, Hawaii, Jan.

57. **J. Zweck**. 1997. "Secondary characteristic currents." *Joint Mathematics Meetings*, San Diego, Jan. 10.

58. **J. Zweck**. 1996. "Stiefel-Whitney currents." *Joint Mathematics Meetings*, Orlando, Jan. 12.

Self-initiated lectures

1. **J. Zweck**. 2019. "The essential spectrum of periodically-stationary solutions of the complex Ginzburg-Landau equation." *Computational Science Seminar, Department of Mathematical Sciences, UT Dallas*, Oct 18th.

2. **J. Zweck**. 2015. "Spectra of Short Pulse Solutions of the Cubic-Quintic Complex Ginzburg Landau Equation near Zero Dispersion.", *Computational Science Seminar, Department of Mathematical Sciences, UT Dallas*, Sept 4th.

3. **J. Zweck**. 2010. "Nonlinear Pulse Dynamics in a Fiber Laser." *Differential Equations Seminar, Department of Mathematics, UMBC*, Oct 4.

4. **J. Zweck**. 2008. "A receiver model for optical communications systems with polarization effects." *Differential Equations Seminar, Department of Mathematics, UMBC*, Nov. 10.

5. **J. Zweck**. 2003. "Level Set Methods and Fast Marching Methods." *Differential Equations Seminar, Department of Mathematics, UMBC*, Nov. 17 & 24.

TEACHING

Doctoral advisement

Name	Date	Thesis Title

Soham Sakar	2027	
Erika Gallo	2/2024	Stability of solutions of the complex Ginzburg-Landau equation
Ali Mozumder[1]	7/2022	Modeling and sensitivity analysis for trace gas sensors
Vrushaly Shinglot	3/2022	Computation and stability analysis of periodically stationary pulses in a short pulse laser
Sonam Lama[2]	7/2020	The stochastic weighted particle method for the computation of the low probability tail of the velocity distribution in spatially homogeneous plasmas
Artur Safin[1]	12/2018	Modeling Trace Gas Sensors with the Coupled Pressure-Temperature Equations
Yanping Chen[2]	12/2016	Deterministic computation of the low probability tail of the velocity distribution due to particle collisions spatially homogeneous plasmas
Justin Jacobs[3]	4/2014	Nonparametric Bayesian density estimation on Riemannian manifolds
Noemi Petra[1,4]	8/2010	Mathematical modeling, analysis, and simulation of trace gas sensors
Hua Jiao[5]	3/2007	Investigation of the combined effect of polarization-mode dispersion and polarization-dependent loss on system performance

(1) Co-advised with S. Minkoff (Mathematics)

(2) Co-advised with M. Goeckner (Physics)

(3) Co-advised with A. Roy (Statistics); UMBC Statistics PhD

(4) UMBC PhD

(5) Co-advised with G. Carter; UMBC Electrical Engineering PhD

First and last known postions of Ph.D. mentees

1. Erika Gallo: Postdoc, NSF RTG, Vertically Integrated Interdisciplinary Training in Mathematics for Human Health, Department of Mathematics, University of Texas at Arlington

2. Ali Mozumder: Instructor, Department of Mathematics, Oregon State University

3. Vrushaly Shinglot: Postdoctoral researcher, Mathematics in Medicine Program, Houston Methodist Weill Cornell Medical College; Circuit simulation engineer, Cadence, San Jose, CA

4. Sonam Lama: Postdoctoral researcher in Electrical and Computer Engineering at UC Santa Barbara; Data Scientist, Archer Daniels Midland

5. Artur Safin: Postdoctoral researcher in computational aquatic data science, Swiss Federal Institute of Aquatic Science and Technology; Systems Engineering Team, Verizon, Richardson, TX

6. Yanping Chen: Data Scientist, Elevate, Dallas; Goldman-Sachs, Dallas

7. Justin Jacobs: National Security Agency; Dr. Jacobs was awarded a Presidential Early Career Award in Science and Engineering (PECASE) in December 2014 for his research at the National Security Agency.

8. Noemi Petra: Research Associate, Center for Computational Geosciences and Optimization Institute for Computational Engineering and Sciences, The University of Texas at Austin; Associate Professor Department of Applied Mathematics, University of California Merced.

Classroom Teaching (NYIT)

Year	Semester	Course No.	Course Name
2025	Fall	MATH 320	Differential Equations
2025	Fall	MATH 170	Calculus One
2025	Spring	MATH 320	Differential Equations
2025	Spring	MATH 161	Applied Calculus

Classroom Teaching (UT Dallas)

Year	Semester	Course No.	Course Name
2024	Fall	MATH 6301.001	Real Analysis
2024	Fall	MATH 2415.004	Calculus of Several Variables
2024	Spring	MATH 4362.001	Partial Differential Equations
2023	Fall	MATH 2415.001	Calculus of Several Variables
2023	Fall	MATH 2415.004	Calculus of Several Variables
2023	Spring	MATH 2415.003	Calculus of Several Variables
2022	Fall	MATH 2415.001	Calculus of Several Variables
2022	Fall	MATH 2415.004	Calculus of Several Variables
2022	Spring	MATH 4355.001	Methods of Applied Mathematics
2021	Fall	MATH 2415.003	Calculus of Several Variables
2021	Fall	MATH 2415.004	Calculus of Several Variables
2021	Spring	MATH 4355.001	Methods of Applied Mathematics
2021	Spring	MATH 5302.001	Elementary Analysis II
2020	Fall	MATH 2415.003	Calculus of Several Variables
2020	Fall	MATH 2415.004	Calculus of Several Variables
2020	Spring	MATH 4355.001	Methods of Applied Mathematics
2020	Spring	MATH 5302.001	Elementary Analysis II
2019	Fall	MATH 2415.001	Calculus of Several Variables
2019	Fall	MATH 2415.002	Calculus of Several Variables
2019	Spring	MATH 5302.001	Elementary Analysis II
2019	Spring	MATH 2415.002	Calculus of Several Variables
2018	Spring	MATH 5302.001	Elementary Analysis II
2018	Spring	MATH 4362.001	Partial Differential Equations
2017	Fall	MATH 2415.001	Calculus of Several Variables
2017	Fall	MATH 2415.002	Calculus of Several Variables
2017	Spring	MATH 2415.001	Calculus of Several Variables
2016	Fall	MATH 7313.001	Partial Differential Equations
2016	Fall	MATH 2415.003	Calculus of Several Variables
2016	Spring	MATH 5302.001	Elementary Analysis II
2016	Spring	MATH 2415.001	Calculus of Several Variables
2015	Fall	MATH 2415.002	Calculus of Several Variables
2015	Fall	MATH 2415.004	Calculus of Several Variables
2015	Spring	MATH 7313.001	Partial Differential Equations
2014	Fall	MATH 2415.001	Calculus of Several Variables
2014	Fall	MATH 2415.004	Calculus of Several Variables
2014	Spring	MATH 2415.002	Calculus of Several Variables
2013	Fall	MATH 6390.001	Topics in Mathematics (Scientific Computing)
2013	Spring	MATH 7313.501	Partial Differential Equations
2012	Fall	MATH 2415.003	Calculus of Several Variables
2012	Fall	MATH 2415.005	Calculus of Several Variables

Classroom Teaching (UMBC)

Courses taught included Multivariable Calculus, Linear Algebra, Vector Calculus with Linear Algebra and Applications, Complex Analysis, Introduction to Analysis II, Matrix Analysis, Differential Geometry, and Functional Analysis.

Postdoctoral Mentees

1. Dr. Yannan Shen, 2013-2015, (nonlinear optics) [Current Postion: Associate Professor, Mathematics, University of Kansas]

Undergraduate Research Mentees

1. Jonah Villafan, Summer 2025–

2. Donovan Harcey, Axel Niyonzima and Rainier Pederson, Spring 2023–Summer 2025, (with M. Goeckner, Physics), "Higher-order moment preservation in stochastic weighted particle method simulations."

3. Ian Schreiber, 2021-2022, (with M. Goeckner, Physics), "Improving rarefied gas simulation methods: Extending SPARTA", *Honors Thesis*

4. Joshua Gammage, 2021, "Parameter continuation methods for periodic pulse solutions of the Ginzburg-Landau equation"

5. Brian Jensen 2020-2021, (with M. Goeckner, Physics) "An inhomogeneous extension of the stochastic weighted particle method for plasma modeling"

6. Jacob Davis, 2019, "Fundamental solution for the Morse-Ingard equations in photoacoustic spectroscopy"

7. Ximone Willis, 2015, "Printed 3D models of curves and surfaces for Calculus III"

8. James Gerity, 2010–2011, (UMBC) "Electromagnetics modeling and simulation for surface enhanced Raman spectroscopy", mentor, [*Senior Thesis in Mathematics and Statistics, May 2011*]

9. William Hardesty, 2010–2011, (UMBC) "Electromagnetics modeling and simulation for surface enhanced Raman spectroscopy", mentor

10. Michael Reid, 2008, (UMBC) "Computational modeling of a quartz-enhanced thermal wave spectroscopy sensor", mentor

11. Austin Rochford, 2006–2008, (UMBC) "Statistical study of local area and curvature of the cingulate gyrus", mentor, [*Senior Thesis in Mathematics and Statistics, May 2008*]

12. Brian Krummel, 2004–2006, (UMBC) "Analysis of curvature of discrete surfaces", mentor, [*UMBC Undergraduate Research Award, 2005, Senior Thesis in Mathematics and Statistics, May 2006*]

13. Lawrence Fomundam, 2004–2005, (UMBC) "Modeling uncertainty in optical communications systems", mentor, [*UMBC Undergraduate Research Award, 2004, Senior Thesis in Mathematics and Statistics, June 2005*]

14. Kevin Li, 2003–2004, (UMBC) Performed research on discrete differential geometry and computational anatomy, mentor

SERVICE

NYIT

2025	Member of College of Arts and Sciences Strategic Planning Committee
2025	Research mentor for Mathematics Department faculty
2025	Faculty advisor for Society for Industrial and Applied Mathematics (SIAM) student chapter (Manhattan campus)

Departmental (UT Dallas)

2024	Committee for Mid-Probationary Review of Mathematical Sciences Assistant Professor
2023	Committee for Mid-Probationary Review of Mathematical Sciences Assistant Professor (chair)
2023	Committee for Mid-Probationary Review of Electrical and Computer Engineering Assistant Professor (chair)
2023	Committee for Promotion of Mathematical Sciences Professor of Instruction
2022–2023	Outreach Committee
2022	Committee for Mid-Probationary Review of Mathematical Sciences Assistant Professor (chair)
2022	"The Mathematical Sciences at UTD", DISD School of Science and Engineering (with Stephen McKeown)
2021–2022	Mathematical Sciences Faculty Short Research Talks @ UTD Welcome Week (co-organizer)
2019	Tenure Review Committee for a Mathematical Sciences Assistant Professor (chair)
2019	Tenure Review Committee for a Mathematical Sciences Assistant Professor

2019	"Putting your best foot forward: What is important for your graduate school application", Talk at IMPACT Summer Camp, May 2019
2019	"Geometry of flight: Classical Greek architecture, satellite orbits, and the search for a missing airplane", Talk at π-day outreach event, March, 2019
2017–2024	Qualifying Exam Grader
2017-2019	Teaching Assistant Training Workshop, co-organizer with Mietek Dabkowski
2017	"Implementation of Active Learning in Calculus Service Courses", presentation at departmental Teaching Assistant Training Workshop, August 2017
2017	"Active Learning Strategies for Math and Stat Problem Sessions", presentation at departmental Teaching Assistant Training Workshop, January 2017
2016–2024	Graduate Admissions Committee
2016	Committee for Mid-Probationary Review of Mathematical Sciences Assistant Professor
2016	Promotion Committee for a Mathematical Sciences Associate Professor
2016	"How to study for qualifying exams", presentation for UTD-SMU SIAM student chapter professional development session, (with P. Choudhary)
2015–2016	Undergraduate Curriculum Committee
2015	Third Year Review Committee for a Mathematical Sciences Assistant Professor
2015–2024	Bachelor of Arts in Mathematics Program Committee
2015–2024	Department Webpages Committee (chair/co-Chair)
2014–2024	Computational Science Seminar (co-organizer)
2014–2015	Ad-hoc Committee for Preparation of UTD Mathematical Sciences Department Program Review
2014–2015	Undergraduate Curriculum Committee (co-Chair)
2014	Third Year Review Committee for a Mathematical Sciences Assistant Professor
2013-2015	Departmental Web Pages liaison

2013–2014   Colloquium and Seminar Committee (Chair)

2013   Promotion and Tenure Committee for a Mathematical Sciences Assistant Professor

2012–2015   Graduate Curriculum Committee

2012–2014   Undergraduate Curriculum Committee

2012–2014   Undergraduate Advising Committee

University (UT Dallas)

2024   Promotion Committee for an Electrical and Computer Engineering Professor

2024   Promotion Committee for a Biological Sciences Professor

2024   Selection committee for President's teaching awards

2024   "Undergraduate learning assistants: A win-win-win for your course", UTD Center for Teaching and Learning workshop, March 26.

2023   Selection committee for President's award for graduate TA

2023   "Active Learning for Calculus Problem Sections", Presentation at The 7th Annual Center for Teaching and Learning, UT Dallas

2022-   UTD Advocates, coordinator and member

2022-2025   ADVANCE ASPIRE^2 Liaison

2021-2024   Committee on Educational Policy

2014–2024   UT Dallas Science/Mathematics Education Advisory Committee

2020   "Active Learning and TA Training for Calculus Problem Sections", Invited Presentation at The 6th Annual Center for Teaching and Learning All-Campus Workshop, "Innovations in Teaching Large and Introductory Courses"

2019   Promotion Committee for a Mechanical Engineering Assistant Professor

2015-2016   Committee on Educational Policy

2014   Promotion Committee for a Mechanical Engineering Associate Professor

Departmental (UMBC)

2012   Mathematics Undergraduate Program Advisor

2012–   Pi Mu Epsilon Mathematics Honors Society Faculty Mentor (joint with Kalman Nanes)

2011–   Department Affairs Committee (member)

2011–   Mathematics Upper Level Elective Courses Committee (chair)

2010–2011   Mathematics program committee (member)

2010   "How to study for qualifying exams", presentation for UMBC SIAM student chapter professional development session, (with Profs. Gowda and Roy)

2009   "Issues to consider when choosing a research advisor", presentation for SIAM student chapter professional development session

2009   Organizer for UMBC@UMBC, Mathematics and Statistics Department graduate student recruiting event

2007-2009   Graduate committee (member)

2005–2007   Faculty Fellow on NSF sponsored "VIP K-16" project between USM, Montgomery County Public Schools, and Montgomery College

2005–2006   Mathematics planning committee (member) (18 month term)

2005–2006   Undergraduate committee (member) (18 month term)

2005–2006   Instigated, coordinated development and ran training program for Math/Stat undergraduate and graduate teaching assistants [Program partially funded by subgrant to department from "VIP K-16" project] (18 month project)

2003–2005   Applied mathematics colloquium organizer

University (UMBC)

2010-2012   Faculty senate (member)

2009-2011   Special research assistantship/initiative support (SRAIS) review committee (member) (3 year term)

2008–2009   Undergraduate research and creative achievment day (URCAD) committee (member)

2007–2008   UMBC writing director hiring committee (committee)

Professional

2025   "New Directions in the Analysis and Computation of Evolution Equations", *8th Annual SIAM Texas-Louisiana Section Conference*, University of Texas at Austin, Austin, TX, Sep 26-28, 2025. (Collaboration with J. Adriazola and A. Aceves)

2024-25   SIAM TX-LA Section, President

2024   *Minisymposium organizer:* "Nonlinear Microresonators and Frequency Microcombs: Experiment, Theory and Simulation", *SIAM Conference on Nonlinear Waves and Coherent Structures*, Baltimore, MD, June 24-27. (Collaboration with C.R. Menyuk and O. Gat)

2024-25   BIG Math Network Steering Committee

2019-24   SIAM TX-LA Section, North Texas District Liaison, and member of external organizing committees for several Annual SIAM Texas-Louisiana Section Conferences

2023   *Minisymposium organizer:* "Stability and Dynamics of Nonlinear Waves and Coherent Structures", *6th Annual SIAM Texas-Louisiana Section Conference*, University of Louisiana Lafayette, LA, Nov 3-5, 2023 (Collaboration with A. Aceves)

2021   *Minisymposium organizer:* "Stability of Breather Solutions of Nonlinear Wave Equations with Applications to Fiber Lasers", *SIAM Conference on Applications of Dynamical Systems (DS21)*, Virtual format, May 23-27, 2021

2019   *Minisymposium organizer:* "Nonlinear wave phenomena: theory and applications", *2nd Annual SIAM Texas-Louisiana Section Conference*, Southern Methodist University, Dallas, TX, Nov 1-3, 2019 (Collaboration with A. Aceves)

2016   *Minisymposium organizer:* "Enhancing Mathematical Learning Experiences with 3D Printing", *SIAM Conference on Applied Mathematics Education*, Philadelphia, PA, Sep 30-Oct 2, 2016

2016   *Minisymposium organizer:* "Modeling for Optical Frequency Combs and Their Applications", *SIAM Conference on Nonlinear Waves and Coherent Structures*, Philadelphia, PA, Aug. 8-11, 2016 (Collaboration with C.R. Menyuk and S. Turitsyn)

2014   Graduation Address, *Department of Mathematics, University of New Mexico*, May 15, 2014.

2010–2012   2012 Infinite Possibilities Conference: member of local organizing committee at UMBC and of registration/outreach/publicity subcommittee

2000–   Lead developer of the software PhoSSiL, the *Photonics Systems Simulator Library*. PhoSSiL is a library of C++ classes that models optical fiber communications and laser systems and includes efficient algorithms for the accurate calculation of the performance of such systems. PhoSSiL is freely available to the optics research community.

2010   *Minisymposium organizer:* "Modeling and Dynamics of Mode-Locked Lasers", *SIAM Conference on Nonlinear Waves and Coherent Structures*, Philadelphia, PA, Aug. 16-19, 2010 (Collaboration with N. Kutz and C.R. Menyuk)

2009   *Minisymposium organizer:* "MS 66, 77, and 87: Dynamics, Stability, and Rare Events for Mode-locked Lasers", *SIAM Annual Meeting*, Denver, CO, July 6-10, 2009 (Collaboration with M.J. Ablowitz and C.R. Menyuk)

2007   *Minisymposium organizer:* "MS10: Modeling for Mid-infrared Sensor Systems", *SIAM Conference on Mathematics for Industry*, Philadelphia, PA, Wednesday October 10th, 2007, (Collaboration with S.E. Minkoff)

2004   *Minisymposium organizer:* "Nonlinear and Stochastic Effects in Optical Fibers and Short-Pulse Lasers", *The Fourth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, Athens, GA, Wednesday Session 3, April 11–14, 2005, (Collaboration with G. Biondini and W.L. Kath)

2004   *Minisymposium organizer:* "Methods for Simulating Rare Events in Stochastic Nonlinear Wave Systems", *First SIAM Nonlinear Waves and Coherent Structures*, Orlando, FL, MS2, October 1–4, 2004, (Collaboration with W.L. Kath)

2002   *Minisymposium organizer:* "Recent Advances in Mathematical Modeling for Optical Fiber Communications - Parts I and II," *SIAM 50th Anniversary and 2002 Annual Meeting*, Philadelphia, PA, MS7 and MS 15 8–12, July 2002, (Collaboration with B.S. Marks)

2000–   Reviewer for *Computers and Mathematics with Applications, Oak Ridge Associated Universities, Applied Physics B, Studies in Applied Mathematics, Nanophotonics, J. Diff. Geo. Appl., Proceedings of Royal Society A, National Science Foundation, SIAM J. Applied Mathematics, SIAM J. Dynamical Systems, Quarterly of Applied Mathematics, Communications in Mathematical Sciences, American Journal of Mathematics, Mathematica Scandinavia, Journal of Mathematical Imaging and Vision, Physical Review E, J. Optical Society of America B, Journal of Optical Communications and Networking, Photonics Technology Letters, Optics Letters, J. Lightwave Technology, Optics Express, J. Quantum Electronics, Mathematics and Computers in*

Simulation, IEE Transactions on Signal Processing, IEEE Transactions on Pattern Analysis and Machine Intelligence, Journal on Optical Communications, UMBC Review

Community

2025	Earl L. Vandermeulen High School, Port Jefferson, Presentations to Calculus class, June 2025.
2023-24	Shepton High School, Volunteer in Alebgra I class
2019	Renner Middle School Science Fair Judge
2017	Ambassador for Global Mathematics Week, Oct 10-17, 2017, Outreach to Schools
2016	Presentation on Polyhedron Models to Grade 3 Mathematics class at Barksdale Elementary, Plano