

Daniel Zwillinger, PhD

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CHIEF SCIENTIST

Dedicated Chief Scientist with career expertise in solving technical and business problems for large and small companies, government labs, consulting, and academia. Experienced in identifying and resolving the key issues of technical problems. Extensive understanding of algorithm design, data analysis, modeling & simulation, and software requirements. Collaborative leader skilled in leveraging computer software tools such as MATLAB, Mathematica, and Python. Eligible to work on DoD contracts. Six Sigma (6 σ) black belt; both Raytheon and ASQ certified. Looking for a technical leadership role with an individual contributor component.

AREAS OF EXPERTISE

Technical Project Management | Leadership | Lean Six Sigma | Data Analysis
Modeling & Simulation | Algorithm Design | Research | Applied Mathematician

PROFESSIONAL EXPERIENCE

BAE Systems, Burlington, MA

Chief Scientist

2018 – 2025

Led creation of research proposals for AFRL, DARPA, DoD, DoS, DTRA, and IARPA. Led IRAD projects on Game Theory and multi-object tracking. Led multiple research teams using Game Theory and Koopman Analysis. Led team creating a patented decentralized data fuser. Mentored junior scientists. Principal Investigator (PI) on several research programs.

- Determined if geographically distributed drones are headed to a common location (DARPA).
- Optimized attacking and defending strategies of supply chains using game theory (AFRL).
- Designed and evaluated COA (Course of Action) metrics aligned with Surprise, Blinding, and Offensive (AFRL).
- Used Koopman models to create fast simulators for deep learning by autonomous vehicles (DARPA).

Autoliv, Lowell, MA

2015 – 2018

Validation Manager

My team designed and created data collection systems, performed environmental testing, and determined radar performance using a fleet of 19 vehicles and 6 full-time drivers. Improved effectiveness, efficiency, capability, and capacity by process improvements.

- Created models for LIDAR object classification, radar calibration & synchronization. Experienced with ISO 17387.

Raytheon, Sudbury, MA

2001 – 2015

Senior Principal Systems Engineer & Six Sigma Black Belt

Systems Engineering activities

- SW requirements lead for C-Band Radar Project Line.
- SW requirements lead for Pre- and Post-Mission Software for Cobra Judy Replacement (CJR).
- SW test lead for Multiple Hypothesis Tracking on UEWR. "Sold off" shall to the government.
- HW test lead for X-band radar calibration exercise at Yuma, AZ.
- Led systems engineering, usability, and deployment for improved Time Card system.

Six Sigma activities

- Achieved \$42M benefit (audited) from my three largest improvement projects.
- Twice won "President's Best Six Sigma Project of the Year." A four-time winner of "Raytheon Innovation Challenge."
- Reduced cost of VV&A (Verification, Validation & Accreditation) process for Zumwalt destroyer (DDG-1000).
- Reduced cost of Patriot Missiles Rolling Wave process (converting planning packages to work packages).
- A Subject Matter Expert (SME) in Design for Six Sigma, Critical Chain Program Management, Voice of the Customer.
- Led the "Trust in Autonomous Systems" effort. Two conference presentations and a book chapter in 1 year.
- Managed (and frequent teacher of) the Six Sigma white/yellow belt training class (for 5 years).

ADDITIONAL RELEVANT EXPERIENCE

Bolt Beranek & Newman (BBN)
Exxon Research and Engineering
The MITRE Corporation
Institute for Defense Analysis (IDA)

IronBridge Networks
Jet Propulsion Laboratory (JPL)
Sandia Laboratories

ENTREPRENEURIAL EXPERIENCE

- Founded a consulting firm, Aztec Corporation. Handled business development, project and personnel management, proposal writing, and client negotiations.
 - Created first release of MATLAB's statistics toolbox for The MathWorks.
 - Principal investigator on Air Force SBIR contracts to develop automated-test equipment (ATE).
 - Managed Department of Transportation SBIR contract: developed CAD tools for luggage simulations.
 - Rewrote the mathematical reference manual for the computer language Macsyma.
- Co-founder of China Spirits Corporation (2014–2017); manufacturer of Chinese liquor.
- Created and sold US patent #9,412,280 to Uber (patented in 4 countries); how to deliver goods by drone.
- US patent granted on information flow between devices.

ACADEMIC EXPERIENCE

Rensselaer Polytechnic Institute, Troy, NY

Assistant Professor of Mathematics & Computer Science

- Taught graduate and undergraduate courses in information theory, probability, statistics, linear algebra, discrete mathematics, differential equations, complex variables, and advanced calculus.
- Published papers on wave theory, information theory, materials engineering, and algorithmic design.

PUBLISHED BOOKS

- Editor-in-chief of *Standard Mathematical Tables and Formulae* (CRC, 30th–33rd editions, 1995–2018), a very successful reference book (first edition in 1928) with two million copies sold.
- Created mathematical reference books - each was "Book of the Month" for the Library of Science book club:
 - *Handbook of Differential Equations* (Academic Press, 1st–4th editions, 1989–2021)
 - *Handbook of Integration* (Jones and Bartlett, 1992).
- Co-authored *Standard Probability and Statistics Tables* (CRC, 2000)
- Editor-in-chief of *Tables of Integrals, Series, and Products* (AP, 6th–8th editions 2000–2014, 9th edition in prep)
- Co-authored *Introducing Game Theory and Its Applications*, 2nd edition (CRC, 2024)

PUBLISHING – OTHER

- Advisory editor for *Handbook of Chemistry and Physics* (CRC, 85th–97th editions, 2004–2016).
- Editor-in-chief of CRC's "Advances in Applied Mathematics" book series (CRC, 2013–present)
<https://www.crcpress.com/Advances-in-Applied-Mathematics/book-series/CRCADVAPPMTH> -- 48 books in series
- Recent publications
 - *Six Sigma Tools in Six Minutes*, <https://www.sixsigmainsixminutes.com/book.pdf>
 - *Voting Power of Teams Working Together*, <http://arxiv.org/abs/1312.3394>
 - *Kuhn Poker with Cheating and Its Detection*, <https://arxiv.org/abs/2011.04450>
 - *The 'Trust V': Building and Measuring Trust in Autonomous Systems*, Chapter 4 in *Robust Intelligence and Trust in Autonomous Systems*, 2016

EDUCATION

PhD - Applied Mathematics | California Institute of Technology

BS – Mathematics | Massachusetts Institute of Technology

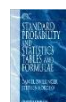
Daniel Zwillinger – Professional Activities

- **Google Scholar** in July 2025 (https://scholar.google.com/citations?user=zHIe1_UAAAAJ)

	All	Since 2020
Citations	7,976	2,555
h-index	11	8
i10-index	11	7

- **Publications – Books**

1. **Understanding 6 Sigma Tools in 6 Minutes**, Zwillinger, self-published, free at <https://www.sixsigmainsixminutes.com/>, 2025. Also available on Amazon.
 - *After becoming a Six Sigma Black Belt, I thought it would be convenient to have a collection of Six Sigma tools, simply described, in one place.*
2. **Introducing Game Theory and its Applications**, E. Mendelson and **Zwillinger**, Chapman and Hall/CRC, 2024.
 - *In recent years, I have become interested in game theory.*
3. **Handbook of Differential Equations**, **Zwillinger** and V. Dobrushkin, 4th edition, Chapman and Hall/CRC, 2021.
 - *Differential equations were my first love. It is convenient to have a collection of techniques, simply described, in one place. My first book, the first edition was published in 1988.*
4. **Standard Mathematical Tables and Formulae**, **Zwillinger**, Editor-in-chief of 30th (1996) through 33rd (2018) editions. 34th edition in preparation (2026). Chapman and Hall/CRC. Chinese and CD-ROM versions of 30th edition available.
 - *When I was in High School, the 28th edition of this was my favorite book.*
5. **Tables of Integrals, Series, and Products**, by Gradshteyn and Ryzhik, 8th edition, **Zwillinger** and V. Moll (eds.). 9th edition in preparation (2025).
 - *A very useful book. When I was a graduate student, I had two copies (5th edition), one for home use and one for office use.*
6. **Standard Probability and Statistics Tables and Formulae**, **Zwillinger** and S. Kokoska, Chapman and Hall/CRC, 2000.
 - *In graduate school, I began to fully appreciate probability and statistics.*
7. **Standard Probability and Statistics Tables and Formulae, Student Edition**, S. Kokoska and **Zwillinger**, Chapman and Hall/CRC, 2000.
 - *A student edition of the above book.*
8. **Handbook of Integration**, **Zwillinger**, Jones & Bartlett (now distributed by AK Peters/CRC), 1992.
 - *I have always considered integration an intellectual exercise. It is convenient to have a collection of techniques, simply described, in one place.*



I am the Editor for CRC's “Advances in Applied Mathematics”– there are currently 48 books in the series. (<https://www.routledge.com/Advances-in-Applied-Mathematics/book-series/CRCADVAPPMTH>)

- **Publications – Refereed**

1. **Zwillinger**, B. Foley, and K. Mittelstaedt, "Six Sigma Tools in Six Minutes," *Six Sigma Forum Magazine*, Volume 15, Number 2, Feb 2016.
2. **Zwillinger**, "As Easy as 1, 3, 9?" *Six Sigma Forum Magazine*, Volume 12, Number 4, Aug 2013, pages 23–26.
3. **Zwillinger**, "Coarsening of Non-Spherical Particles," *Journal of Crystal Growth*, **94**, No. 1, 1989, pages 159–165.
4. **Zwillinger**, "Differential PPM has a Higher Throughput than PPM for the Band-Limited and Power-Limited Optical Channel," *IEEE Transactions on Information Theory*, **34**, No. 5, September 1988, pages 1269–1273.
5. **Zwillinger**, "Morphological Stability of Two Particle Diffusion in Three Dimensions," *Journal of Crystal Growth*, **74**, No. 1, 1986, pages 48–56.
6. **Zwillinger**, "Random Sum of Sines," *Applied Acoustics*, **19**, 1986, pages 305–307.
7. **Zwillinger** and B. S. White, "Propagation of Initially Plane Waves in the Region of Random Caustics," *Wave Motion*, **7**, 1985, pages 207–227.
8. **Zwillinger**, "A Goldbach Conjecture Using Twin Primes," *Mathematics Of Computation*, **33**, No. 147, July 1979, page 1071.

- **Publications – Other**

1. **Zwillinger** and P. San Clemente, "Game theory analysis when playing the wrong game," 17 Jul 2023, <https://arxiv.org/abs/2307.10257>
2. A. Metzner and **Zwillinger**, "Kuhn Poker with Cheating and Its Detection," 9 Nov 2020, <https://arxiv.org/abs/2011.04450>
3. G. Palmer, A. Selwyn, and **Zwillinger**, "The "Trust V": Building and Measuring Trust in Autonomous Systems," In book: "Robust Intelligence and Trust in Autonomous Systems" (pages 55-77), Springer, April 2016.
4. **Zwillinger**, "Voting Power of Teams Working Together," 12 Dec 2013, <http://arxiv.org/abs/1312.3394>
5. E. Brookner, B. Porter, K. Chang, Y.-C. Chang, **Zwillinger**, B. Considine, and T. Sikina, "Demonstration of accurate prediction of PAVE PAWS embedded element gain," 2010 IEEE International Symposium on Phased Array Systems and Technology, pp 417-422, 12-15 Oct 2010
6. **Zwillinger**, "Judge's Commentary: The Outstanding Irrigation Papers," *The Journal of Undergraduate Mathematics and Its Applications*, Fall 2006, Vol. 27, No. 3, pages 329–332.
7. **Zwillinger**, "Judge's Commentary: The Outstanding Flood Planning Papers," *The Journal of Undergraduate Mathematics and Its Applications*, Fall 2005, Vol. 26, No. 3, pages 279–281.
8. **Zwillinger**, "Judge's Commentary: The Outstanding Grade Inflation Papers," *The Journal of Undergraduate Mathematics and Its Applications*, Fall 1998, Vol. 19, No. 3, pages 323–327.
9. **Zwillinger**, "Judge's Commentary: The Outstanding Helix Intersections Papers," *The Journal of Undergraduate Mathematics and Its Applications*, Fall 1995, Vol. 16, No. 3, pages 251–253.
10. M. T. Strauss and **Zwillinger**, "Luggage Simulation," *CADalyst*, October 1995, page 29.
11. **Zwillinger**, "Visualization of Circuit Card EM Fields," US Government report, AD-A347-002, March 1998.
12. **Zwillinger**, "Visualization of Circuit Card Electromagnetic Fields," US Government report, AD-A291 491, January 1995.
13. Strauss and **Zwillinger**, "A Luggage Simulation Tool," Final Report for Department of Transportation contract DTRS-57-93-C-00113, March 1994.
14. **Zwillinger** and M. Sousa, "Analytical Determination of the Matrix Pseudo-Inverse," *Macsyma Newsletter*, **VII**, No. 3, July 1990, pages 1-8.
15. S. Marsh, M. Glicksman and **Zwillinger**, "Statistical Mechanics of Mushy Zones," *Modeling and Control of Casting and Welding Processes IV*, A. F. Giamei and G. J. Abbaschian (eds.), The Metallurgical Society, Warrendale, P.A., 1988, pages 921-928.

16. **Zwillinger**, "Completing The L -th Power in $Z[x]$," *SIGSAM Journal of The ACM*, **18**, No. 3, issue 71, pages 20–22, August 1984.

- **Presentations**

1. Daniel C. Fox, ..., **Zwillinger**, ..., "Resolution for Object Detection in Satellite Imagery: A Class-Specific Approach", NCTA 2025, *17th International Conference on Neural Computation Theory and Applications*, Marbella - Spain, October 22–24, 2025, <https://ncta.scitevents.org>
2. **Zwillinger** and M. Gerken, "Mathematical modeling and analysis of aircraft flight data," MORS (Military Operations Research Society) Emerging Techniques Forum, Laurel MD, 7 December 2023.
3. **Zwillinger**, "Math Models & Tools (Not Mathematical Modeling)," Tufts University, Mathematics graduate student presentation, 15 March 2023.
4. **Zwillinger**, J. Sierchio, M. Gerken, and E. Clark, "Distributing data throughout a MANET in a communications denied environment: reinforcement learning and game theory approaches," 6 June 2022, in Proceedings Volume 12113, *Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications IV*; 121130G (2022) <https://doi.org/10.1117/12.2618517>, Event: SPIE Defense + Commercial Sensing, 2022, Orlando, Florida.
5. **Zwillinger**, "Topics in differential equations: exact, approximate, and numerical," Tufts University, Mathematics graduate student presentation, 31 March 2021.
6. A. Metzner and **Zwillinger**, "Cheating and its detection in games such as poker and paintball," Joint Mathematics Meeting, Denver, CO, 16 January 2020.
7. L. Bookman, J. Ubnoske, and **Zwillinger**, "Classifying the difficulty of the k -clique problem," Joint Mathematics Meeting, Baltimore, MD, 15 January 2019.
8. A. Zagorianakos and **Zwillinger**, "Assessing Design Impact Using a Multi-Accurate Measurement Model," WCX 17: SAE World Congress Experience, Detroit, MI, March 2017.
9. **Zwillinger**, "Six Sigma Tools in Six Minutes," presentation to the Granite State section of the ASQ (American Society for Quality), NH, 17 May 2016.
10. **Zwillinger**, "Six Sigma Tools in Six Minutes," presentation to the Merrimack Valley section of the ASQ (American Society for Quality), MA, 7 April 2016.
11. S. P. Marsh, C. S. Pande (Naval Research Laboratory, Washington, DC); M. E. Glicksman (Rensselaer Polytechnic Institute, Troy, NY); **Zwillinger** (Aztec Corporation, Waltham, MA), Environmental noise effects in statistical coarsening theory, in *Computational and Mathematical Models of Microstructural Evolution*, Materials Research Society meeting, 14–16 April 1998
12. **Zwillinger**, "Computer Verification of Integral Tables," 1993 SIAM National Meeting, Philadelphia. (12 July 1993)
13. S. P. Marsh, **Zwillinger**, and M. E. Glicksman, "A General Geometric Model of Coarsening: Mathematical Development--I," invited paper, 1988 SIAM National Meeting.
14. **Zwillinger**, M. E. Glicksman, and S. P. Marsh, "A General Geometric Model of Coarsening: Mathematical Development--II," invited paper, 1988 SIAM National Meeting.
15. **Zwillinger**, S. P. Marsh, and M. E. Glicksman, "Statistical Mechanics of Mesoscale Behavior," contributed paper, 1987 SIAM National Meeting.

- **Student Engagements**

1. **Mentor for collegiate student projects (BAE Systems funded)**
 - 2020 – D. Rice and **Zwillinger** – Rensselaer Polytechnic Institute (RPI) capstone project – Can you recover a building's floorplan from exfiltratable cell phone data?
 - 2021 – **Zwillinger** and C. Svoboda – Rensselaer Polytechnic Institute (RPI) capstone project – Can drones quickly identify people from the exterior of a burning building?

- 2023 – **Zwillinger** – Worcester Polytechnic Institute (WPI) MQP (Major Qualifying Project) – Can 10 autonomous drones survey a building’s interior 10 times faster than 1 drone?
 - 2024 – **Zwillinger** and A. Nolan – Worcester Polytechnic Institute (WPI) GQP (Graduate Qualifying Project) – How many pixels are required for object identification?
2. Visiting SIAM (Society of Industrial and Applied Mathematics) lecturer, 1992–1999. Lectured to undergraduates on applied mathematics topics at Worcester Polytechnic Institute (WPI), University of Rhode Island (URI), and other locations.

- **Patents**

1. Impact Initiated Automated Information Transfer

- **Zwillinger**; 2025
- <https://patents.google.com/patent/US12284001B2>
- Patented in US. Patent pending in China & India.
- *This patent uses the fact that acceleration is a vector (and not a scalar) to transfer information between devices without a UI.*



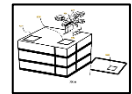
2. Custodianship model for decentralized track fusion

- E. Duchon, I.-J. Nelson, S. Li, H. Vo, **Zwillinger**; 2021
- <https://patents.google.com/patent/US11057740B2>
- *This patent distributes information processing among a drone swarm.*



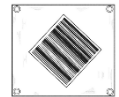
3. Cooperative system and method for precise autonomous delivery

- **Zwillinger**, R. Hettich, and J. Cogliandro; 2016
- <https://patents.google.com/patent/US9412280B1>
- Patented in US, Canada, European Union, and Japan; sold to Uber
- *This patent informs a drone where to deliver a package.*



4. Tarp having a unique identifier and a plurality of grommets for drone navigation

- **Zwillinger**, R. Hettich, and J. Cogliandro; 2017
- <https://patents.google.com/patent/USD797648S1>
- *This design patent supports the above drone delivery patent.*



5. Tarp with sleeve for drone navigation (Design patent)

- **Zwillinger**, R. Hettich, and J. Cogliandro; 2017
- <https://patents.google.com/patent/USD796418S1>
- *This design patent supports the above drone delivery patent.*

