

# Tobin A. Driscoll

tobydriscoll.net

## Research interests

- Numerical analysis & scientific computing
- Applications of mathematics and computing to the life sciences and medicine
- Scientific machine learning
- Mathematical software in MATLAB and Julia

## Professional experience

### University of Delaware

- |  |              |
|--|--------------|
| • Unidel Chaired Professor of Mathematical Sciences        | 2023–present |
| • Professor, Department of Mathematical Sciences           | 2010–present |
| • Director, Master of science in data science program      | 2023–2025    |
| • Affiliated Faculty, Department of Biomedical Engineering | 2010–present |
| • Associate Professor, Department of Mathematical Sciences | 2004–2010    |
| • Assistant Professor, Department of Mathematical Sciences | 2000–2004    |

### University of Colorado at Boulder

- |   |           |
|---|-----------|
| • Postdoctoral research fellow, Department of Applied Mathematics | 1996–1999 |
|---|-----------|

## Education

### Ph.D. in Applied Mathematics

Cornell University	1991–1996
--------------------	-----------

- Dissertation: Domain decomposition methods for conformal mapping and eigenvalue problems
- Advisor: Lloyd N. Trefethen

## **B.S. in Mathematics with honors, B.S. in Physics**

Pennsylvania State University

1987–1991

- Honors thesis title: Comparison of computational efficiency and sensitivity of several solution algorithms for the linear–quadratic optimal control problem
- Advisor: John E. Dzielski

## **Honors and awards**

- Unidel Chaired Professorship, University of Delaware 2023
- Outstanding Scholar Award, College of Arts & Sciences, University of Delaware 2014
- Winner, 100 Digit Challenge (SIAM) 2002
- NSF VIGRE Postdoctoral Fellow, University of Colorado 1999–2000
- NSF Mathematical Sciences Postdoctoral Research Fellow 1996–1999
- SIAM Outstanding Paper Prize 1999
- Runner-up, Richard C. DiPrima Dissertation Prize 1998
- Second Prize, Leslie Fox Competition 1997
- SIAM Student Paper Prize Honorable Mention 1995
- NSF Graduate Research Fellow 1991–1994
- A. D. White Fellow (Cornell University graduate study) 1991–1994
- Braddock Scholar (Penn State University undergraduate study) 1987–1991

## **Grants**

- R. J. Braun (PI), T. A. Driscoll (co-PI). Models for Tear Film Structure, Dynamics and Parameter Identification. NSF DMS-1909846, \$375,000. 2019–2022
- R. J. Braun (PI), T. A. Driscoll, and K. L. Maki (co-PIs). Collaborative Research: Tear Film Dynamics: Modeling, Blinking, and Computation. NSF DMS-1412085, \$375,003. 2014–2017
- M. McCulloch (PI), T. A. Driscoll, and G. Schleiniger (co-PIs). Data driven mathematical modeling of the hypoplastic left heart syndrome circulation. NIH Delaware INBRE III, \$60,724. 2014–2016
- T. A. Driscoll. Special support from The MathWorks, Inc. 2013–2015
- M. McCulloch (PI), T. A. Driscoll, and G. Schleiniger (co-PIs). Computer simulation of the single ventricle anatomy and physiology explaining mechanisms for sudden cardiac death. NIH Delaware INBRE Grant, \$44,182. 2013–2014
- T. A. Driscoll (PI) with 5 other key personnel. Meeting the need in mathematics at the University of Delaware. U.S. Department of Education Graduate Assistance in Areas of National Need, \$527,700. 2012–2015
- R. J. Braun (PI) and T. A. Driscoll (co-PI), Modeling tear film dynamics. NSF DMS-1022706, \$444,000. 2010–2013

- L. F. Rossi, T. Driscoll, and R. Luke (co-PIs), Strengthening mathematics instruction with automated algorithmic mastery activities. Center for Teaching Effectiveness (UD), \$20,000.
- R. Braun (PI), L. P. Cook, and T. A. Driscoll (co-PIs), Modeling the blink cycle and lipid dynamics in the tear film. NSF DMS-0616483, \$325,000. 2006–2009
- H. B. White et al. (co-PIs), with T. A. Driscoll and others as senior personnel. Howard Hughes Medical Institute Undergraduate Science Education grant, \$1,500,000. 2006–2010
- R. Braun, T. A. Driscoll, P. Monk, L. F. Rossi (co-PIs). NSF Scientific Computing Research Environments for the Mathematical Sciences. NSF DMS-0322583, \$68,460. 2003
- University of Delaware International Travel Award 2003
- T. A. Driscoll (PI). Novel fast and accurate methods for partial differential equations. NSF DMS-0104229, \$88,407. 2001–2004
- T. A. Driscoll (PI). Fast time stepping for the computational simulation of differential equations. University of Delaware Research Foundation, \$21,042. 2001–2002
- T. A. Driscoll (PI). NSF Mathematical Sciences Postdoctoral Research Fellowship (University of Colorado). NSF DMS-9627677, \$75,000. 1996–1999

## Scholarly works

See also my [Google Scholar site](#).

## Books

- T. A. Driscoll and R. J. Braun. *Fundamentals of Numerical Computation*, [online edition](#) in Julia, MATLAB, and Python 2025
- T. A. Driscoll and R. J. Braun. *Fundamentals of Numerical Computation: Julia Edition*, SIAM
- L. N. Trefethen, A. Birkisson, and T. A. Driscoll. *Exploring ODEs*, SIAM 20182022
- T. A. Driscoll and R. J. Braun. *Fundamentals of Numerical Computation*, SIAM 2017
- T. A. Driscoll, N. Hale, and L. N. Trefethen, eds. *Chebfun Guide*, 1st edition. Oxford, UK 2014
- T. A. Driscoll, *Learning MATLAB*, Society for Industrial and Applied Mathematics 2009
- T. A. Driscoll and L. N. Trefethen. *Schwarz–Christoffel Mapping*, Cambridge University Press 2002

## Book chapters

- R. J. Braun, T. A. Driscoll, and C. G. Begley, “Mathematical Models of the Tear Film,” in *Ocular Fluid Dynamics: Anatomy, Physiology, Imaging Techniques, and Mathematical Modeling*, Springer–Birkhäuser, 2019.
- T. A. Driscoll and B. Fornberg. Padé-based interpretation and correction of the Gibbs phenomenon. In *Advances in the Gibbs Phenomenon*, ed. by A. Jerri, Sigma Sampling Publishing, Potsdam, NY, 2007.
- T. A. Driscoll and L. N. Trefethen. Numerical construction of conformal maps. Appendix to *Fundamentals of Complex Analysis with Applications to Engineering, Science, and Mathematics*, 3rd edition, by E. D. Saff and A. D. Snider, Prentice Hall, 2002.

## Preprints

- Driscoll, Tobin A., and Yuxing Zhou. Greedy Thiele Continued-Fraction Approximation on Continuum Domains in the Complex Plane. [arXiv:2510.07295](#). Preprint, October 2025.
- Driscoll, Tobin A. RationalFunctionApproximation.jl: Rational Approximation On Discrete and Continuous Domains. [arXiv:2512.06140](#). Preprint, arXiv, December 2025.
- Chen, Q. and T. A. Driscoll and A. Roy. Operator learning for models of tear film breakup. Submitted to *Applied Numerical Mathematics*, 2025.

## Refereed articles

- [65] Chen, Q., Driscoll, T. A., and Braun, R. J. Evaporation-driven tear film thinning and breakup in two space dimensions. *Journal of Engineering Mathematics* 149, no. 1 (2024): 5. [10.1007/s10665-024-10407-6](#).
- [64] Driscoll, T. A., Nakatsukasa, Y., and Trefethen, L. N. (2024). [AAA Rational Approximation on a Continuum](#). *SIAM Journal on Scientific Computing*, 46(2), A929–A952, 2024. [10.1137/23M1570508](#)
- [63] Driscoll, T. A., Braun, R. J., Luke, R. A., Sinopoli, D., Phatak, A., Dorsch, J., Begley, C. G., and Awisi-Gyau, D. (2023). [Fitting ODE models of tear film breakup](#). *Modeling and Artificial Intelligence in Ophthalmology*, 5(1), 1–36. [10.35119/maio.v5i1.128](#)
- [62] Taranchuk, M. J., Cummings, L. J., Driscoll, T. A., and Braun, R. J. (2023). [Extensional flow of a free film of nematic liquid crystal with moderate elasticity](#). *Physics of Fluids*, 35(6), 062113. [10.1063/5.0151809](#)
- [61] Driscoll, T., Braun, R. J., and Begley, C. G. (2021). [Automatic detection of the cornea location in video captures of fluorescence](#). *Modeling and Artificial Intelligence in Ophthalmology*, 3(1), Article 1. [10.35119/maio.v3i1.113](#)
- [60] Luke, R. A., Braun, R. J., Driscoll, T. A., Awisi-Gyau, D., and Begley, C. G. (2021). [Parameter Estimation for Mixed-Mechanism Tear Film Thinning](#). *Bulletin of Mathematical Biology*, 83(5), 56. [10.1007/s11538-021-00871-x](#)
- [59] Braun, R. J., Luke, R. A., Driscoll, T. A., and Begley, C. G. (2021). [Dynamics and mechanisms for tear breakup \(TBU\) on the ocular surface](#). *Mathematical Biosciences and Engineering*, 18(5), Article mbe-18-05-262. [10.3934/mbe.2021262](#)
- [58] Luke, R. A., Braun, R. J., Driscoll, T. A., Begley, C. G., and Awisi-Gyau, D. (2020). [Parameter Estimation for Evaporation-Driven Tear Film Thinning](#). *Bulletin of Mathematical Biology*, 82(6), 71. [10.1007/s11538-020-00745-8](#)
- [57] Aiton, K. W., and Driscoll, T. A. (2020). [Preconditioned Nonlinear Iterations for Overlapping Chebyshev Discretizations with Independent Grids](#). *SIAM Journal on Scientific Computing*, 42(4), A2360–A2370. [10.1137/19m1242483](#)
- [56] Driscoll, T. (2019). *ComplexRegions.jl: A Julia package for regions in the complex plane*. *Journal of Open Source Software*, 4(44), 1811. [10.21105/joss.01811](#)
- [55] Aiton, K. W., and Driscoll, T. A. (2019). [An Adaptive Partition of Unity Method for Multivariate Chebyshev Polynomial Approximations](#). *SIAM Journal on Scientific Computing*, 41(5), A3230–A3245. [10.1137/18m1184904](#)

- [54] Maki, K. L., Henshaw, W. D., McManus, A., Braun, R. J., Chapp, D. M., and Driscoll, T. A. (2019). **A model for tear film dynamics during a realistic blink**. Journal for Modeling in Ophthalmology, 3, 21–27. [10.35119/maio.v2i3.91](#)
- [53] Braun, R. J., Driscoll, T. A., Begley, C. G., King-Smith, P. E., and Siddique, J. I. (2018). **On tear film breakup (TBU): Dynamics and imaging**. Mathematical Medicine and Biology, 35(2), 145–180. [10.1093/imammb/dqw023](#)
- [52] Aiton, K. W., and Driscoll, T. A. (2018). **An adaptive partition of unity method for Chebyshev polynomial interpolation**. SIAM Journal on Scientific Computing, 40(1), A251–A265. [10.1137/17m112052x](#)
- [51] Driscoll, T. A., Braun, R. J., and Brosch, J. K. (2018). **Simulation of parabolic flow on an eye-shaped domain with moving boundary**. Journal of Engineering Mathematics, 111(1), 111–126. [10.1007/s10665-018-9957-7](#)
- [50] Brosch, J. K., Wu, Z., Begley, C. G., Driscoll, T. A., and Braun, R. J. (2017). **Blink characterization using curve fitting and clustering algorithms**. Journal for Modeling in Ophthalmology, 1(3), 60–81. [10.35119/maio.v1i3.38](#)
- [49] Li, L., Braun, R. J., Driscoll, T. A., Henshaw, W. D., Banks, J. W., and King-Smith, P. E. (2016). **Computed tear film and osmolarity dynamics on an eye-shaped domain**. Mathematical Medicine and Biology, 33(2), 123–157. [10.1093/imammb/dqv013](#)
- [48] Driscoll, T. A., Süli, E., and Townsend, A. (2016). **New directions in numerical computation**. Notices of the American Mathematical Society, 63(4), 398–400. [10.1090/noti1363](#)
- [47] Driscoll, T. A., and Hale, N. (2015). **Rectangular spectral collocation**. IMA Journal of Numerical Analysis, 36(1), 108–132. [10.1093/imanum/dru062](#)
- [46] Deng, Q., Braun, R., and Driscoll, T. A. (2014). **Heat transfer and tear film dynamics over multiple blink cycles**. Physics of Fluids, 26(7), 071901. [10.1063/1.4887341](#)
- [45] Driscoll, T. A., and Weideman, J. (2014). **Optimal domain splitting for interpolation by Chebyshev polynomials**. SIAM Journal on Numerical Analysis, 52(4), 1913–1927. [10.1137/130919428](#)
- [44] Deng, Q., Braun, R. J., Driscoll, T. A., and King-Smith, P. E. (2013). **A model for the tear film and ocular surface temperature for partial blinks**. Interfacial Phenomena and Heat Transfer, 1(4), 357–381. [10.1615/interfacphenomheattransfer.v1.i4.40](#)
- [43] Birkisson, A., and Driscoll, T. A. (2012). **Automatic Fréchet Differentiation for the Numerical Solution of Boundary-Value Problems**. ACM Transactions on Mathematical Software, 38(4), 1–29. [10.1145/2331130.2331134](#)
- [42] Deng, Q., and Driscoll, T. A. (2012). **A Fast Treecode for Multiquadric Interpolation with Varying Shape Parameters**. SIAM Journal on Scientific Computing, 34(2), A1126–A1140. [10.1137/110836225](#)
- [41] Braun, R., Usha, R., McFadden, G., Driscoll, T. A., Cook, L., and King-Smith, P. E. (2012). **Thin film dynamics on a prolate spheroid with application to the cornea**. Journal of Engineering Mathematics, 73(1), 121–138. [10.1007/s10665-011-9482-4](#)
- [40] Reid, W. M., Driscoll, T. A., and Doty, M. F. (2012). **Forming delocalized intermediate states with realistic quantum dots**. Journal of Applied Physics, 111, 056102. [10.1063/1.3691113](#)

- [39] Neves, A. M. A., Driscoll, T. A., Heryudono, A. R. H., Ferreira, A. J. M., Soares, C. M. M., and Jorge, R. M. N. (2011). **Adaptive Methods for Analysis of Composite Plates with Radial Basis Functions**. *Mechanics of Advanced Materials and Structures*, 18(6), 420–430. [10.1080/15376494.2010.528155](https://doi.org/10.1080/15376494.2010.528155)
- [38] Driscoll, T. A. (2010). **Automatic spectral collocation for integral, integro-differential, and integrally reformulated differential equations**. *Journal of Computational Physics*, 229(17), 5980–5998. [10.1016/j.jcp.2010.04.029](https://doi.org/10.1016/j.jcp.2010.04.029)
- [37] Heryudono, A. R. H., and Driscoll, T. A. (2010). **Radial Basis Function Interpolation on Irregular Domain through Conformal Transplantation**. *Journal of Scientific Computing*, 44(3), 286–300. [10.1007/s10915-010-9380-3](https://doi.org/10.1007/s10915-010-9380-3)
- [36] Usher, D. C., Driscoll, T. A., Dhurjati, P., Pelesko, J. A., Rossi, L. F., Schleinig, G., Pusecker, K., and White, H. B. (2010). **A transformative model for undergraduate quantitative biology education**. *CBE Life Sciences Education*, 9(3), 181–188. [10.1187/cbe.10-03-0029](https://doi.org/10.1187/cbe.10-03-0029)
- [35] DeLillo, T. K., Driscoll, T. A., Elcrat, A. R., and Pfaltzgraff, J. A. (2008). **Radial and circular slit maps of unbounded multiply connected circle domains**. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 464(2095), 1719–1737. [10.1098/rspa.2008.0006](https://doi.org/10.1098/rspa.2008.0006)
- [34] Driscoll, T. A., Bornemann, F., and Trefethen, L. N. (2008). **The chebop system for automatic solution of differential equations**. *BIT Numerical Mathematics*, 48(4), 701–723. [10.1007/s10543-008-0198-4](https://doi.org/10.1007/s10543-008-0198-4)
- [33] Maki, K. L., Braun, R. J., Driscoll, T. A., and King-Smith, P. E. (2008). **An overset grid method for the study of reflex tearing**. *Math. Med. Biol.*, 25, 187–214. [10.1093/imammb/dqn013](https://doi.org/10.1093/imammb/dqn013)
- [32] Driscoll, T. A., and Heryudono, A. R. H. (2007). **Adaptive residual subsampling methods for radial basis function interpolation and collocation problems**. *Computers and Mathematics with Applications*, 53(6), 927–939. [10.1016/j.camwa.2006.06.005](https://doi.org/10.1016/j.camwa.2006.06.005)
- [31] Driscoll, T. A., and Maki, K. L. (2007). **Searching for Rare Growth Factors Using Multicanonical Monte Carlo Methods**. *SIAM Review*, 49(4), 673–692. [10.1137/050637662](https://doi.org/10.1137/050637662)
- [30] Heryudono, A., Braun, R. J., Driscoll, T. A., Maki, K. L., Cook, Lp., and PE, K.-S. (2007). **Single-equation models for the tear film in a blink cycle: Realistic lid motion**. *Mathematical Medicine and Biology-a Journal of The Ima*, 24(4), 347–377. [10.1093/imammb/dqm004](https://doi.org/10.1093/imammb/dqm004)
- [29] DeLillo, T. K., Driscoll, T. A., Elcrat, A. R., and Pfaltzgraff, J. A. (2006). **Computation of Multiply Connected Schwarz-Christoffel Maps for Exterior Domains**. *Computational Methods and Function Theory*, 6(2), 301–315. [10.1007/BF03321616](https://doi.org/10.1007/BF03321616)
- [28] Pelesko, J. A., and Driscoll, T. A. (2006). **The effect of the small-aspect-ratio approximation on canonical electrostatic MEMS models**. *Journal of Engineering Mathematics*, 53(3–4), 239–252. [10.1007/s10665-005-9013-2](https://doi.org/10.1007/s10665-005-9013-2)
- [27] Platte, R. B., and Driscoll, T. A. (2006). **Eigenvalue stability of radial basis function discretizations for time-dependent problems**. *Computers and Mathematics with Applications*, 51(8), 1251–1268. [10.1016/j.camwa.2006.04.007](https://doi.org/10.1016/j.camwa.2006.04.007)



- [26] Driscoll, T. A. (2005). [Algorithm 843: Improvements to the Schwarz-Christoffel toolbox for MATLAB](#). ACM Transactions on Mathematical Software (TOMS), 31(2), 239–251. [10.1145/1067967.1067971](#)
- [25] Platte, R. B., and Driscoll, T. A. (2005). [Polynomials and Potential Theory for Gaussian Radial Basis Function Interpolation](#). SIAM Journal on Numerical Analysis, 43(2), 750–766. [10.1137/040610143](#)
- [24] Collins, C. R., Driscoll, T. A., and Stephenson, K. (2004). [Curvature flow in conformal mapping](#). Computational Methods and Function Theory, 3(1), 325–347. [10.1007/bf03321041](#)
- [23] Driscoll, T. (2004). [Book Review: A Practical Guide to Boundary Element Methods With the Software Library BEMLIB](#). By C. P. OZRIKIDIS. CRC Press, 2002. Journal of Fluid Mechanics, 505, 378–379. [10.1017/s0022112004008201](#)
- [22] Platte, R. B., and Driscoll, T. A. (2004). [Computing eigenmodes of elliptic operators using radial basis functions](#). Computers and Mathematics with Applications, 48(3–4), 561–576. [10.1016/j.camwa.2003.08.007](#)
- [21] Driscoll, T. A., and Gottlieb, H. (2003). [Isospectral shapes with Neumann and alternating boundary conditions](#). Physical Review E, 68(1), 016702. [10.1103/physreve.68.016702](#)
- [20] Driscoll, T. A. (2002). [A Composite Runge–Kutta Method for the Spectral Solution of Semilinear PDEs](#). Journal of Computational Physics, 182(2), 357–367. [10.1006/jcph.2002.7127](#)
- [19] Driscoll, T. A., and Fornberg, B. (2002). [Interpolation in the limit of increasingly flat radial basis functions](#). Computers and Mathematics with Applications, 43(3–5), 413–422. [10.1016/s0898-1221\(01\)00295-4](#)
- [18] Fornberg, B., Driscoll, T. A., Wright, G., and Charles, R. (2002). [Observations on the behavior of radial basis function approximations near boundaries](#). Computers and Mathematics with Applications, 43(3–5), 473–490. [10.1016/s0898-1221\(01\)00299-1](#)
- [17] Driscoll, T. A., and Fornberg, B. (2001). [A Padé-based algorithm for overcoming the Gibbs phenomenon](#). Numerical Algorithms, 26(1), 77–92. [10.1023/A:1016648530648](#)
- [16] Goano, M., Bertazzi, F., Caravelli, P., Ghione, G., and Driscoll, T. A. (2001). [A general conformal-mapping approach to the optimum electrode design of coplanar waveguides with arbitrary cross section](#). IEEE Transactions on Microwave Theory and Techniques, 49(9), 1573–1580. [10.1109/22.942569](#)
- [15] Driscoll, T. A., and Fornberg, B. (2000). [Note on nonsymmetric finite differences for Maxwell's equations](#). Journal of Computational Physics, 161(2), 723–727. [10.1006/jcph.2000.6524](#)
- [14] Ghrist, M., Fornberg, B., and Driscoll, T. A. (2000). [Staggered time integrators for wave equations](#). SIAM Journal on Numerical Analysis, 38(3), 718–741. [10.1137/s0036142999351777](#)
- [13] Driscoll, T. A. (1999). [A Nonoverlapping Domain Decomposition Method for Symm's Equation for Conformal Mapping](#). SIAM Journal on Numerical Analysis, 36(3), 922–934. [10.1137/S0036142997324162](#)
- [12] Driscoll, T. A. (1999). Computational Conformal Mapping (book review). SIAM Review, 41(4), 832–834.

- [11] Driscoll, T. A., and Fornberg, B. (1999). [Block pseudospectral methods for Maxwell's equations II: Two-dimensional, discontinuous-coefficient case](#). SIAM Journal on Scientific Computing, 21(3), 1146–1167. [10.1137/s106482759833320x](#)
- [10] Fornberg, B., and Driscoll, T. A. (1999). [A fast spectral algorithm for nonlinear wave equations with linear dispersion](#). Journal of Computational Physics, 155(2), 456–467. [10.1006/jcph.1999.6351](#)
- [9] Driscoll, T. A., Toh, K.-C., and Trefethen, L. N. (1998). [From Potential Theory to Matrix Iterations in Six Steps](#). SIAM Review, 40(3), 547–578. [10.1137/S0036144596305582](#)
- [8] Driscoll, T. A., and Fornberg, B. (1998). [A Block Pseudospectral Method for Maxwell's Equations: I. One-Dimensional Case](#). J. Comput. Phys., 140, 1–19. [10.1006/jcph.1998.5883](#)
- [7] Driscoll, T. A., and Vavasis, S. A. (1998). [Numerical conformal mapping using cross-ratios and Delaunay triangulation](#). SIAM Journal on Scientific Computing, 19(6), 1783–1803. [10.1137/s1064827596298580](#)
- [6] Driscoll, T. A. (1997). [Eigenmodes of Isospectral Drums](#). SIAM Review, 39(1), 1–17. [10.1137/S0036144595285069](#)
- [5] Driscoll, T. A., and Trefethen, L. N. (1996). [Pseudospectra for the wave equation with an absorbing boundary](#). Journal of Computational and Applied Mathematics, 69(1), 125–142. [10.1016/0377-0427\(95\)00021-6](#)
- [4] Driscoll, T. A. (1996). [Algorithm 756: A MATLAB toolbox for Schwarz-Christoffel mapping](#). ACM Transactions on Mathematical Software (TOMS), 22(2), 168–186. [10.1145/229473.229475](#)
- [3] Baggett, J. S., Driscoll, T. A., and Trefethen, L. N. (1995). [A mostly linear model of transition to turbulence](#). Physics of Fluids, 7(4), 833–838. [10.1063/1.868606](#)
- [2] Dzielski, J. E., and Driscoll, T. A. (1993). Error bound on the solution of a linear differential equation in Chebyshev series. International Journal of Systems Science, 24(7), 1317–1327. [10.1080/00207729308949562](#)
- [1] Trefethen, L. N., Trefethen, A. E., Reddy, S. C., and Driscoll, T. A. (1993). Hydrodynamic stability without eigenvalues. Science, 261(5121), 578–584. [10.1126/science.261.5121.578](#)

## Refereed proceedings and posters

- Tichenor, A. A., P. Situ, T. A. Driscoll, C. G. Begley, and R. J. Braun. “Linking TBU Mechanisms and the Neurosensory Response in Dry Eye Subjects.” Investigative Ophthalmology & Visual Science 65, no. 7 (2024): 6572–6572.
- Situ, P., A. A. Tichenor, T. A. Driscoll, C. G. Begley, and R. J. Braun. “Neurosensory Function Changes Induced by Tear Film Instability (TFI)-Related Stress in Dry Eye: A Pilot Study.” Investigative Ophthalmology & Visual Science 65, no. 7 (2024): 6566–6566.
- Driscoll, T. A., A. A. Tichenor, P. Situ, R. J. Braun, and C. G. Begley. “Optimized Models of Tear Breakup (TBU) Mechanisms in Dry-Eye (DE) and Non-DE Subjects.” Investigative Ophthalmology & Visual Science 65, no. 7 (2024): 6559–6559.
- R. J. Braun, T. Driscoll, C. Begley, P. Situ, A. Tichenor, and R. Luke, “Tear Breakup (TBU) Analysis with Fluorescence (FL) and Thermal (TH) imaging,” Investigative Ophthalmology & Visual Science, vol. 64, no. 8, pp. 186–186, Jun. 2023.



- R. J. Braun, T. A. Driscoll et al., “Data and Analysis from Tear Breakup (TBU) in Normal Subjects,” *Investigative Ophthalmology & Visual Science*, vol. 63, no. 7, pp. 3950-A0230, Jun. 2022.
- R. A. Luke et al., “Fitting Simplified Models to Machine Learning-Identified Tear Film Breakup,” in *Investigative Ophthalmology & Visual Science*, Jun. 2021, vol. 62, p. 1315.
- R. J. Braun, L. Zhong, T. A. Driscoll, C. G. Begley, D. Antwi, P. E. King-Smith. Models for Tear Break Up Dynamics and Imaging. 7th European Conference on Computational Fluid Dynamics, 2018.
- Joseph Brosch, T. A. Driscoll, Richard Braun. Simulation of Thin Film Equations on an Eye-Shaped Domain with Moving Boundary. APS March Meeting Abstracts, 2016.
- Lan Zhong, C. F. Ketelaar, R. J. Braun, T. A. Driscoll, P. E. King-Smith, C. G. Begley. Mathematical Modeling of Glob-Driven Tear Film Breakup. *Investigative Ophthalmology & Visual Science*, 2016.
- L. Zhong, C. F. Ketelaar, R. J. Braun, T. A. Driscoll, P. E. King-Smith, and C. G. Begley. A Model Problem for Blob-Driven Tear Film Breakup (TBU). *Bull. Amer. Physical Soc.* 60: 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, 2015.
- M. Stapf, R. J. Braun, C. G. Begley, T. A. Driscoll, and P. E. King-Smith. Modeling Tear Film Evaporation and Breakup with Duplex Films. *Bull. Amer. Physical Soc.* 60: 68th Annual Meeting of the APS Division of Fluid Dynamics Boston, 2015.
- R. J. Braun, L. Li, W. Henshaw, T. A. Driscoll, and P. E. King-Smith. Solute Dynamics and Imaging in the Tear Film on an Eye-shaped Domain, *Bull. Amer. Physical Soc.* 60: 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, MA, 2015.
- C. Ketelaar, L. Zhong, R. J. Braun, T. A. Driscoll, P. E. King-Smith, and C. G. Begley. Tear Film Dynamics Around a Rigid Model Blob, *Bull. Amer. Physical Soc.* 60: 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, 2015.
- M. McCulloch, G. Schleiniger, L. Chen, S. Gidding, and T. A. Driscoll. Data driven mathematical modeling of the single ventricle anatomy and physiology. Highlighted Poster (refereed), NISBRE IDeA Conference, 2014.
- L. N. Trefethen and T. A. Driscoll. Schwarz–Christoffel mapping in the computer era. *Proceedings of the International Congress of Mathematicians*, Vol. III (Berlin, 1998). *Doc. Math.* 1998, Extra Vol. III, 533–542 (electronic).
- G. Wojcik, B. Fornberg, R. Waag, J. Mould, T. A. Driscoll, and L. Nikodym. Pseudospectral methods for large-scale bioacoustic models. *Proceedings of the 1997 IEEE Ultrasonics Symposium*.

## Software

- T. A. Driscoll. [RationalFunctionApproximation.jl](#). Approximation by rational functions on complex domains in Julia.
- T. A. Driscoll. [ComplexRegions.jl](#). Complex regions and paths in Julia.
- L. N. Trefethen and others, [Chebfun](#). (Major Driscoll contributions noted for the releases below.)
  - 2014: Version 5.0 (with many collaborators): Design and rewrite of software for object-oriented modularity.
  - 2011: Version 4.0 (with N. Hale): Rectangular formulations for robust ODE systems

- 2009: Version 3.0 (with A. Birkisson): Automatic differentiation and solution for nonlinear operators
- 2008: Version 2.0 (with F. Bornemann): Chebop, for automatic solutions of differential equations (BVP, eigenvalue, PDE)
- T. A. Driscoll. [Schwarz–Christoffel Toolbox for MATLAB](#)
  - 2002: Module for solving Laplace’s equation with piecewise constant boundary conditions.
  - 2000: Object-oriented interface for polygons and maps.
  - 1996: Inclusion of CRDT algorithm for elongated regions.
  - 1994: Initial release.
- See also [my GitHub page](#).

## Presentations

- “Computational rational approximation of functions.” Plenary speaker, Annual meeting of the Australian Mathematical Society, La Trobe University, Australia. 2025
- “Why your calculator is (slightly) lying—and why that’s OK.” Public lecture, Annual meeting of the Australian Mathematical Society, La Trobe University, Australia. 2025
- “A software package for rational approximation.” Invited talk at Banff International Research Station, Banff, Alberta. 2025
- “Numerical rational approximation in Julia, MATLAB, and Python.” Invited seminar at Harvard University. 2025
- “RationalFunctionApproximation.jl.” JuliaCon 2025 contributed talk, Pittsburgh, PA. 2025
- “Data-driven modeling and simulation of the human tear film.” Delaware Math Modeling Camp (for high-school students). 2025
- “Modeling and simulation of the human tear film.” Colloquium at Temple University, Philadelphia, PA. 2024
- “Data-driven modeling and simulation of the human tear film.” Delaware Math Modeling Camp (for high-school students). 2024
- “The AAA algorithm in the complex plane.” Plenary speaker, Numerical Analysis in the 21st Century, University of Oxford. 2023
- “Data-driven discovery of dynamics.” Delaware Data Science Symposium, University of Delaware. 2023
- “Putting course notes online.” Seminar, University of Delaware. 2023
- “Data-driven modeling and simulation of the human tear film.” Colloquium, Michigan Technological University, Houghton, MI. 2023
- “AAA in the complex plane.” Invited seminar for the Complex Analysis Video Seminar (CAvid) 2023
- “Analysis of tear-film breakup using fluorescence video recordings.” Colloquium at Appalachian State University. 2022
- “Detection of tear film breakup using Julia.” JuliaCon 2021 contributed talk. 2021
- “Simulation of tear film dynamics with blinking.” SIAM Annual Meeting, online. 2020
- “Preconditioning nonlinear equations with domain decomposition.” AMS Eastern Sectional Meeting, University of Delaware. 2018

- “Exploring differential equations using Chebfun.” SIAM Annual Meeting Minisymposium, Portland, OR. 2018
- “Dynamics on a model blinking eye-shaped domain.” SIAM Annual Meeting Minisymposium, Portland, OR. 2018
- “Mathematical and computational modeling of the tear film.” Center for Bioinformatics & Computational Biology Seminar, University of Delaware. 2017
- “Dynamics on a model blinking eye-shaped domain.” SIAM Annual Meeting Minisymposium, Boston, 2016
- “Data-driven systemic modeling of infant hypoplastic left heart syndrome.” Center for Cardiovascular Health Symposium, University of Delaware. 2015
- “Flipping the classroom for numerical computation.” MathWorks Research Summit, Natick, MA. 2015
- “Automatic multivariate approximation.” SIAM Computational Science and Engineering Conference Minisymposium, Salt Lake City, AZ. 2015
- “An open-source software project for numerical conformal mapping.” Invited talk at the BIRS Workshop on Modern Applications of Complex Variables, Banff, Canada. 2015
- “New directions in spectral methods.” Numerical Analysis Seminar, Cornell University. 2014
- “Optimal splitting in spectral collocation.” Numerical Analysis Group Seminar, University of Oxford. 2013
- “Numerical computing with functions.” Colloquium, Wichita State University. 2013
- “Reflections on flipping a math classroom.” Summer Faculty Institute, University of Delaware. 2013
- “Optimal splitting in spectral collocation.” Seminar, Arizona State University, Tempe, AZ. 2013
- “Numerical computing with functions.” Colloquium, Temple University, Philadelphia, PA. 2012
- “Chebfun beyond the ordinary (DE).” Chebfun and Beyond Workshop, University of Oxford. 2012
- “Spectral deferred correction for time-dependent PDEs in Chebfun,” SIAM Annual Meeting minisymposium, Minneapolis 2012
- “Chebfun for PDE,” **Eigenvalues/singular values and fast PDE algorithms: acceleration, conditioning, and stability**, Banff International Research Station, Banff, Alberta. 2012
- “Optimal splitting in spectral collocation,” Del-Mar Numerical Analysis Day, University of Delaware. 2012
- “Differential equations in Chebfun.” Seventh International Congress on Industrial and Applied Mathematics minisymposium, Vancouver, BC. 2011
- “Rectangular projections for reliable spectral collocation,” Seventh International Congress on Industrial and Applied Mathematics minisymposium, Vancouver, BC. 2011
- “Chebfun: A software system for interacting with functions,” NSF-CBMS Conference on Radial Basis Functions, Dartmouth, MA. 2011
- “Approximation Theory, Spectral Methods, and Chebfun” (with L. N. Trefethen), Fifth annual Dobbiaco Summer School, Dobbiaco, Italy. 2011
- “Automatic Fréchet differentiation for the spectral solution of boundary-value problems,” SIAM Annual Meeting minisymposium, Pittsburgh, PA. 2010
- “Automatic solution of differential equations in the Chebfun system,” Annual Meeting of the Canadian Applied and Industrial Mathematics Society, University of Western Ontario. 2009

- “Automatic solution of differential equations in the Chebfun system,” SIAM Southeastern-Atlantic Section Conference, University of South Carolina, 2009
- “Automatic solution of differential equations in the Chebfun system,” Seminar at the Courant Institute, 2009
- “Solving continuous differential equations numerically: Chebfun and chebop.” SIAM Annual Meeting, San Diego. 2008
- “Least squares methods for conformal mapping and boundary value problems.” SIAM Annual Meeting, San Diego, CA. 2008
- “Solving continuous differential equations numerically: Chebfun and chebop.” Seminar at the University of Manchester, Manchester, UK. 2008
- “Solving continuous differential equations numerically: Chebfun and chebop.” Numerical Analysis Group Seminar, University of Oxford, 2008
- “Solving continuous differential equations numerically: Chebfun and chebop.” Seminar at the University of Dundee, Dundee, UK. 2008
- “Modeling and simulation of human tear film dynamics,” Colloquium, SUNY Buffalo. 2007
- “Detection and approximation of jumps using complex-variable techniques.” 7th International Conference on Spectral and High-Order Methods (ICOSAHOM) minisymposium, Beijing, China. 2007
- “Spectral least-squares for conformal mapping and potential theory.” Computational and Conformal Geometry Workshop, SUNY Stony Brook. 2007
- “Radial basis function methods for meshless PDE computation,” Seminar, New Jersey Institute of Technology. 2007
- “Radial basis function methods for meshless PDE computation,” Seminar at the Oxford University Computing Laboratory. 2007
- “Conformal mapping 2.0,” Colloquium, Dartmouth College. 2006
- “Developing a computational framework for conformal mapping,” SIAM Annual Meeting, Boston. 2006
- “Optimal node placement for Gaussian radial basis function interpolation,” SIAM Annual Meeting, Boston. 2006
- “Optimal node placement for Gaussian radial basis function interpolation,” Seminar, Tufts University. 2006
- “SVD-based importance sampling for finding rare events in noisy optical transmission,” Rice University. 2004
- “SVD-based importance sampling for an optics-based dynamical system,” SIAM Nonlinear Waves and Coherent Structures, University of Central Florida. 2004
- “Schwarz–Christoffel maps to surfaces in space,” University of Maryland, Baltimore County. 2004
- “High-order time stepping methods for electromagnetics,” Computational Electromagnetics workshop, Math. Forschungsinstitut Oberwolfach. 2004
- “Solution of Laplace’s equation by conformal mapping.” Oxford University Computing Laboratory. 2003
- “The EigTool system for exploring matrix eigenmode problems,” International Congress on Industrial and Applied Mathematics minisymposium, Sydney, Australia, 2003
- “Numerical conformal mapping in 2003: A survey,” International Congress on Industrial and Applied Mathematics minisymposium, Sydney, Australia. 2003

- “Overdetermined formulations for eigenmode problems,” International Congress on Industrial and Applied Mathematics minisymposium, Sydney, Australia. 2003
- “Directed random walks and importance sampling for noisy optical communications,” IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, 2003
- “Schwarz–Christoffel mapping in MATLAB,” European Microwave Week, Milan, Italy. 2002
- “Use of the SVD for finding rare events in noisy optical communications,” SIAM Annual Meeting 2002
- “Schwarz–Christoffel conformal mapping,” University of Delaware. 2002
- “Significant perturbations of NLS from SVD analysis,” Northwestern University. 2002
- “Significant perturbations of NLS from SVD analysis,” University of Maryland, Baltimore County. 2001
- “Schwarz–Christoffel conformal mapping,” Plenary speaker at Computational Methods and Function Theory, University of Aveiro, Portugal. 2001
- “Fast time stepping methods for semilinear evolution equations,” Northwestern University. 2001
- “Wavenumber-dependent time stepping methods for semilinear evolution equations,” IMACS Conference on Nonlinear Waves minisymposium, University of Georgia, Athens, GA. 2001
- “Radial basis functions for the simulation of PDEs.” 2000
  - Courant Institute
  - University of Delaware
  - Brown University
- “High-order space and time methods for propagation problems.” 2000
  - University of California–Santa Barbara
  - University of Michigan
  - University of Delaware
- “High-order space and time methods for propagation problems,” Georgia Institute of Technology. 1999
- “An efficient spectral method for the solution of nonlinear wave equations,” Dundee Numerical Analysis Conference. 1999
- “An efficient spectral method for the solution of nonlinear wave equations,” Colorado Days at Los Alamos National Laboratory. 1999
- “Staggered time integrators for wave equations,” Oxford University Computing Laboratory. 1998
- “Block pseudospectral methods for Maxwell’s equations in inhomogeneous media.” 1998
  - SIAM Annual Meeting
  - SIAM Conference on Wave Propagation
  - Los Alamos Days at Colorado
- “Spectrally accurate summation of Fourier series for functions with jump discontinuities,” University of Colorado, Boulder. 1998
- “Block pseudospectral methods for Maxwell’s equations in inhomogeneous media,” Oak Ridge National Laboratory seminar. 1998
- “Schwarz–Christoffel mapping in MATLAB,” Seminar at the University of Tennessee, Knoxville. 1998
- “Uses of the Berenger PML with psuedospectral methods for Maxwell’s equations.” Poster at IUTAM: Computational Methods for Unbounded Domains, Boulder, CO. 1997

- “Numerical conformal mapping using cross-ratios and Delaunay triangulation.” Computational Methods and Function Theory. 1997
- “Numerical conformal mapping using cross-ratios and Delaunay triangulation.” ISAAC Conference, University of Delaware. 1997
- “Numerical conformal mapping using cross-ratios and Delaunay triangulation.” Lesile Fox Prize Competition, University of Dundee. 1997
- “Eigenmodes of isospectral drums.” 1997
  - Colorado State University
  - Colorado School of Mines
  - University of Colorado, Denver
  - MIT
- “Numerical conformal mapping using cross-ratios and Delaunay triangulation,” University of Colorado, Boulder, CO. 1996
- “Schwarz–Christoffel mapping in MATLAB.” 1996
  - Wichita State University
  - University of Colorado
- “Eigenmodes of isospectral drums.” 1995
  - MATLAB conference, Natick, MA
  - SIAM Annual Meeting
  - ICOSAHOM
  - Cornell University
- “Conformal mapping and the convergence of Krylov iterations.” Colorado Conference on Iterative Methods, Breckenridge, CO. 1994
- “Schwarz–Christoffel mapping in MATLAB.” 1994
  - Universität Karlsruhe
  - ETH, Zürich
- “Pseudospectra of the wave operator with an absorbing boundar.” SIAM Annual Meeting contributed talk. 1993
- “Schwarz–Christoffel mapping in MATLAB.” Cornell Numerical Analysis Day. 1993

## Other works

- T. A. Driscoll. Review of *Elements of Scientific Computing*, by Tveito, Langtangen, Nielsen, and Cai. SIAM Review 53, 807–808, 2011.
- M. Hassner, D. V. Leykin, and T. A. Driscoll. An analytic model of MR/GMR head sensitivity function. IBM Research Report RJ 10167, 1999.
- T. A. Driscoll. Review of *Computational Conformal Mapping*, by P. K. Kythe. SIAM Review 41 (1999), 832–834.
- T. A. Driscoll. Uses of the Berenger PML in pseudospectral methods for Maxwell’s equations. Proceedings of the 1997 IUTAM Symposium on Computational Methods for Unbounded Domains, T. L. Geers, ed.
- T. A. Driscoll. *Domain Decomposition Methods for Conformal Mapping and Eigenvalue Problems*. Ph.D. thesis, Center for Applied Mathematics, Cornell University, 1996.
- T. A. Driscoll and B. Land. Vibrations of isospectral drums. Computer animation video produced at the Cornell Theory Center, 1995.



- T. A. Driscoll. Schwarz–Christoffel Toolbox user’s guide. Cornell Computer Science Technical Report TR 94-1422, 1994.

## Teaching

### Graduate students supervised

- Yuxing Zhou, Ph. D. in progress
- Arnab Roy, Ph. D. candidate
- Qinying Chen, Ph. D. expected 2026
- Kevin Aiton, Ph.D., 2019
- Shawn Abernethy, M.S. with thesis, 2013
- Quan Deng, Ph.D., 2013
- Alfa Heryudono, Ph.D., 2008
- Rodrigo Platte, Ph.D., 2005

### Philosophy

While I enjoy lecturing, I no longer believe it should be the only or even primary way of teaching most math classes. The marginal benefits of a live lecture over a recorded one are overshadowed by supervised active learning, where the instructor shares expertise with students as they wrestle with the material themselves. I use techniques such as problem-based learning, laboratory exploration, personal response systems, and flipping the classroom to create active learning opportunities. In addition, I believe mathematics needs to embrace teaching computation throughout the curriculum, rather than quarantining it into a few courses or lab sections.

### Undergraduate courses

- Introduction to data science (freshman/sophomore level)
- Calculus A,B,C (including special section of Calculus A for life sciences majors)
- Honors Calculus B
- Linear algebra (math and engineering majors)
- ODEs (math and engineering majors)
- PDEs (math and engineering majors)
- Computational mathematics (two-semester sequence)
- Honors computational mathematics
- Complex analysis

### Graduate courses

- Numerical linear algebra and nonlinear equations

- Numerical ODEs/PDEs
- Spectral/high-order methods for PDEs
- Radial basis functions

## Service activities

### Department of Mathematical Sciences

- Director of Graduate Studies (Delaware), 2011–2014
- Director of Undergraduate Studies (Delaware), 2018–2021
- Member of ad hoc committee to create the B.S. degree in Quantitative Biology
- Initial proposer of B.S. degree in Applied Mathematics
- Chaired ad hoc committee to create B.S. degree in Data Science
- Created Math 219, Data Science I

### College and university

- Director of the Master of Science program in Data Science, 2023–2025
- ADVANCE Fellow and Senior Fellow, 2020–2023
- Faculty Senate Ad-Hoc Subcommittee on Promotion Criteria for Continuing Track Faculty, 2021–2022
- University Strategic Planning Working Group on Redefining Creativity, Innovation and Entrepreneurship, 2021
- Faculty Senate Promotion and Tenure Committee, 2018–2020 (Chair for 2019–2020)
- Faculty Senate Undergraduate Studies Committee, 2008–2010
- Arts & Sciences Educational Affairs Committee, 2004–2005

### Profession

- Editor-in-Chief of the SIAM book series on Software, Environments, and Tools, 2026–present
- Communicating Editor of *Advances in Computational Mathematics*, 2019–present
- At-Large Member of the SIAM Council, 2015–2018
- Associate Editor of *Journal of Engineering Mathematics*, 2010–2015
- Associate Editor of the *SIAM Journal on Scientific Computing*, 2008–2014
- Organizing committee of Mathematical Problems in Industry, 2004 (Delaware)