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. 2007
- 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 2022
- L. N. Trefethen, A. Birkisson, and T. A. Driscoll. *Exploring ODEs*, SIAM 2018
- 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**

[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**

[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**

[36] Usher, D. C., Driscoll, T. A., Dhurjati, P., Pelesko, J. A., Rossi, L. F., Schleiniger, 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**

[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**

[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**

[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**

[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**

[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**

[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**

[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**

[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**

[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**

[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

- 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, Universtiy 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.
- "Numerical computing with functions." Colloquium, Temple University, Philadelphia, PA. 2013 2012
- "Chebfun beyond the ordinary (DE)," Chebfun and Beyond Workshop, University of Oxford.
- "Spectral deferred correction for time-dependent PDEs in Chebfun," SIAM Annual Meeting minisymposium, Minneapolis 2012 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.
- "High-order time stepping methods for electromagnetics," Computational 2004
  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.
- "Wavenumber-dependent time stepping methods for semilinear evolution equations," 2001
  IMACS Conference on Nonlinear Waves minisymposium, University of Georgia, Athens, GA.
- "Radial basis functions for the simulation of PDEs." 2000–2001
  - 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.
- "Block pseudospectral methods for Maxwell's equations in inhomogeneous media." 1998–1999
  - 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)