

Johnny Guzmán

Professor
Division of Applied Mathematics
Brown University
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Employment

Brown University, Division of Applied Mathematics

2020- Full Professor (Associate Chair, 2025-)
2013-2020 Associate Professor
2008-2013 Assistant Professor

University of Minnesota, School of Mathematics

2005-2008 NSF Postdoctoral Fellow (advisor: Bernardo Cockburn)

Education

Cornell University

2005 Ph.D. Applied Mathematics (advisor: Lars Wahlbin)

California State University-Long Beach (CSULB)

1999 B.S. Mathematics (primary mentors: Robert Mena and Kent Merryfield)

Cerritos Community College

1995-1997 Completed General Education courses

Journal Articles

Appeared/ In Press

1. J. Guzmán, Quadrature and Schatz's pointwise estimates in finite element methods, BIT 45 (2005), 695-707.
2. J. Guzmán, Local analysis of discontinuous Galerkin methods applied to singularly perturbed problems, J. Numer. Math. 14 (2006), 41-56.

3. J. Guzmán, Pointwise estimates for discontinuous Galerkin methods with lifting operators for elliptic problems, *Math. Comp.* 75 (2006), 1067-1085.
4. J. Guzmán, Local and pointwise error estimates of the local discontinuous Galerkin method for Stokes Problem, *Math. Comp.* 77 (2008), 1293-1322.
5. B. Cockburn, B. Dong and J. Guzmán, Optimal convergence of the original discontinuous Galerkin method for the transport-reaction equation on special meshes, *SIAM J. Numer. Anal.* 46 (2008), 1250-1265.
6. B. Cockburn and J. Guzmán, Error estimates for the Runge-Kutta discontinuous Galerkin method for the transport equation with discontinuous initial data, *SIAM J. Numer. Anal.* 46 (2008), 1364-1398.
7. B. Cockburn, B. Dong and J. Guzmán, A superconvergent LDG-hybridizable Galerkin method for secondorder elliptic problems, *Math. Comp.* 77 (2008), 1887-1916.
8. B. Cockburn, J. Guzmán and H. Wang, Superconvergent discontinuous Galerkin methods for second-order elliptic problems, *Math. Comp.*, 78 (2009), 1-24.
9. E. Burman, J. Guzmán and D. Leykekhman, Weighted error estimates of the continuous interior penalty method for singularly perturbed problems, *IMA J. Numer. Anal.*, 29 (2009), 284-314.
10. J. Guzmán, and B. Riviere, Suboptimal convergence of nonsymmetric discontinuous Galerkin method for odd polynomial approximations, *J. Sci. Comp.*, 40 (2009), 273-280.
11. J. Guzmán, D. Leykekhman, J. Rossmann and A. Schatz, Hölder estimates for Greens functions on convex polyhedral domains and their applications to finite element methods, *Numer. Math.*, 112 (2009), 221-243.
12. B. Cockburn, B. Dong and J. Guzmán, A hybridizable and superconvergent discontinuous Galerkin method for biharmonic problems, *J. Sci. Comput.*, 40 (2009), 141-187.
13. B. Cockburn, J. Guzmán, C.-S. Soon and H. Stolarski, Analysis of the embedded discontinuous Galerkin method for second-order elliptic problems, *SIAM J. Num. Anal.*, 47 (2009), no. 4, 2686-2707.
14. B. Cockburn, B. Dong, J. Guzmán, M. Restelli and R. Sacco, A hybridizable discontinuous Galerkin method for steady state convection-diffusion-reaction problems, *SIAM J. Sci. Comp.*, 31 (2009), no. 5, 3827-3846.
15. B. Cockburn, J. Gopalakrishnan and J. Guzmán, A new elasticity element made for enforcing weak stress symmetry, *Math. Comp.*, 79 (2010), 1331-1349.
16. B. Cockburn, B. Dong, J. Guzmán and J. Qian, Optimal convergence of the original DG method in special meshes for variable velocity, *Siam J. Num. Anal.*, 48 (2010), no. 1, 133-146.
17. J. Guzmán, A unified analysis of several mixed methods for elasticity with weak symmetry, *J. Sci. Comp.*, 44 (2010), 156-169.
18. A. Demlow, J. Guzmán, and A.H. Schatz, Local energy estimates for the finite element method on sharply varying grids, *Math. Comp.* 80 (2011), 1-9.
19. W. Wang, J. Guzmán and C.-W. Shu, The multiscale discontinuous Galerkin method for solving a class of second-order elliptic problems with rough coefficients, *Int. J. Numer. Anal. Model.*, 8(2011), no. 1, 28-47.
20. J. Gopalakrishnan and J. Guzmán, A second elasticity element using the matrix bubble, *IMA J. Numer. Anal.*, to appear.

21. E.M. Behrens and J. Guzmán, A mixed method for the biharmonic problem based on a system of first order equations, *SIAM J. Numer. Anal.*, 49 (2011), 789-817.
22. E.M. Behrens and J. Guzmán, A new family of mixed methods for the Reissner-Mindlin plate model based on a system of first-order equations, *J. Sci. Comp.*, 49 (2011), 137-166.
23. J. Gopalakrishnan and J. Guzmán, Symmetric non-conforming mixed finite elements for linear elasticity, *SIAM J. Numer. Anal.*, 49 (2011), 1504-1520.
24. J. Guzmán and D. Leykekhman, Pointwise error estimates of finite element approximations to the Stokes problem on convex polyhedra, *Math. Comp.*, 81(2012), 1879-1902.
25. J. Guzmán and M. Neilan, A family of non-conforming elements for the Brinkman problem, *IMA J. Numer. Anal.*, 32 (2012), no. 4, 1484-1508.
26. J. Guzmán, D. Leykekhman and M. Neilan, A family of non-conforming elements and analysis of Nitsche's method for a singularly perturbed fourth-order problem, *Calcolo*, 49 (2012), 95-125.
27. B. Cockburn, J. Guzmán and F.J. Sayas, Coupling of RT and HDG with BEM, *SIAM J. Numer. Anal.* 50 (2012), no. 5, 2778-2801.
28. J. Guzmán and M. Neilan, Conforming and divergence free Stokes elements on general triangular meshes, *Math. Comp.*, 83 (2014) , no. 285, 15-36.
29. J. Guzmán, A. Salgado and F.-J. Sayas, A note on the Ladyzenskaja-Babuska-Brezzi condition, *J. Sci. Comp.*, 56 (2013), 219-229.
30. J. Guzmán and M. Neilan, Conforming and symmetric mixed finite elements for plane elasticity using rational bubbles, *Numer. Math.*, 126(2014), no. 1, 153-171.
31. S. Badia, R. Codina, T. Gudi and J. Guzmán, Error Analysis of Discontinuous Galerkin Methods for Stokes Problem under Minimal Regularity, *IMA. J. Num. Anal.*, 34(2014), no.2, 800-819.
32. D. Arnold, R. Falk, J. Guzmán and G. Tsogtgerel, On the consistency of the combinatorial codifferential, *Trans. Amer. Math. Soc.* 366 (2014), no. 10, 5487-5502.
33. T. Gudi and J. Guzmán, Convergence analysis of the lowest order weakly penalized adaptive discontinuous Galerkin methods, *ESAIM Math. Model. Numer. Anal.* 48 (2014), no. 3, 753-764.
34. J. Guzmán and M. Neilan, Conforming and divergence free Stokes elements in three dimensions, *IMA J. Numer. Anal.* 34 (2014), no. 4, 1489-1508.
35. Y. Zhang, W. Wang, J. Guzman and C.-W. Shu, Multi-scale discontinuous Galerkin method for solving elliptic problems with curvilinear unidirectional rough coefficients, *J. Sci. Comput.* 61 (2014), no. 1, 42-60.
36. J. Guzmán and C. Klivans, Chip firing and energy minimization on M-matrices, *J. Combin. Theory Ser. A* 132 (2015), 14-31.
37. J. Guzmán and M. Sanchez-Urbe, Max-norm Stability of low order Taylor-Hood elements in three dimensions, *J. Sci. Comput.* 65 (2015), no. 2, 598-621.
38. J. Guzman, M. Sanchez-Urbe and M. Sarkis, On the accuracy of finite element approximations to a class of interface problems, *Math. Comp.* 85 (2016), no. 301, 2071-2098.
39. M. Ainsworth, J. Guzman and F.-J. Sayas, Discrete extension operators for mixed methods on locally refined meshes, *Math. Comp.*, 85 (2016), no. 302, 2639-2650.
40. J. Guzmán, M. Sanchez-Urbe and M. Sarkis, Higher-order finite elements methods for elliptic problems with interfaces, *M2AN*, 50 (2016), no. 5, 1561-1583.

41. J. Guzmán, F. A. Sequeira, and C.-W. Shu, H(div) conforming and DG methods for incompressible Euler's equations, *IMA J. Numer. Anal.* (2016).
42. J. Guzmán, M. Sanchez-Urbe and M. Sarkis, A Finite Element Method for High-Contrast Interface Problems with Error Estimates Independent of Contrast, *Journal of Scientific Computing* 73 (1), 330-365.
43. J. Guzmán and C. Klivans, Chip-firing on general invertible matrices, *SIAM J. Discrete Math.* 30 (2016), no. 2, 1115–1127.
44. E. Burman, J. Guzmán, M. Sanchez-Urbe and M. Sarkis, Robust flux error estimation of an unfitted Nitsche method for high-contrast interface problems, *IMA Journal of Numerical Analysis*, 646-668, 2017.
45. J. Guzmán and M. Olshanskii, Inf-sup stability of geometrically unfitted Stokes finite elements, *Math. Comp.* 87 (313), 2091-2112, 2018.
46. J. Guzmán and R. Scott, The Scott-Vogelius finite elements revisited, *Math. Comp.*, 88, 515-529, 2019.
47. J. Guzmán A. Madureira, M. Sarkis and S. Walker, Analysis of the finite element method for the Laplace--Beltrami equation on surfaces with regions of high curvature using graded meshes, *Journal of Scientific Computing* 77 (3), 1736-1761, 2018.
48. J. Guzmán and M. Neilan, Inf-sup stable finite elements on barycentric refinements producing divergence-free approximations in arbitrary dimensions, *SIAM Journal on Numerical Analysis* 56 (5), 2826-2844, 2018.
49. J. Guzmán and R. Scott, Cubic Lagrange elements satisfying exact incompressibility, *SMAI-Journal of computational mathematics*, 4, 345--374, 2018.
50. G. Fu, J. Guzmán and M. Neilan, Exact smooth piecewise polynomial sequences on Alfeld splits, *Mathematics of Computation*. 2020;89(323):1059-91.
51. J. Guzmán, A. Lischke, and M. Neilan. Exact sequences on Powell-Sabin splits, *Calcolo*. 2020 Jun; 57(2):1-25.
52. E. Cáceres, J. Guzmán and M. Olshanskii, New stability estimates for an unfitted finite element method for two-phase Stokes problem, *SINUM*. 2020; 58(4):2165-92.
53. G. Barrenechea, E. Burman, and J. Guzmán, Well-posedness and H (div)-conforming finite element approximation of a linearised model for inviscid incompressible flow, *M3AS*. 2020, Jan 14.
54. E. Burman, R. Durst and J. Guzmán, Stability and error analysis of a splitting method using Robin-Robin coupling applied to a fluid-structure interaction problem, *Numer. Methods Partial Differ. Eq.*. (2021), 1-11.
55. D. Boffi, J. Guzman, M. Neilan, Convergence of Lagrange finite elements for the Maxwell Eigenvalue Problem in 2D, *IMA J. Num. Anal.*, 2023 Mar;43(2):663-91.
56. Burman E, Durst R, Fernández MA, Guzmán J. Fully discrete loosely coupled Robin-Robin scheme for incompressible fluid-structure interaction: stability and error analysis, 2020, *Numer. Math*, 2022 Aug;151(4):807-40.
57. N. Ahmed, G.R. Barrenechea, E. Burman, J. Guzmán, A. Linke, C. Merdon, A pressure-robust discretization of Oseen's equation using stabilization in the vorticity equation, *SINUM*. 2021;59(5):2746-74.

58. G. Awanou, M. Fabien, J. Guzmán, A. Stern, Hybridization and postprocessing in finite element exterior calculus, 2020, *Math. Comp.*, 2023 Jan;92(339):79-115.
59. J. Guzmán, A. Lischke, M. Neilan, Exact sequences on Worsey-Farin Splits, 2020, *Math. Comp.*, 2022 Nov;91(338):2571-608.
60. S.H. Christiansen, J. Gopalakrishnan, J. Guzmán, K. Hu, A discrete elasticity complex on three-dimensional Alfeld splits, *Numer. Math.*, 2023, 1-46.
61. J. Guzmán, A.J. Salgado, Estimation of the continuity constants for Bogovskii and regularized Poincare integral operators, *Journal of Mathematical Analysis and Applications*. 2021;502(1):125246.
62. E. Burman, J. Guzmán, Implicit-explicit multistep formulations for finite element discretisations using continuous interior penalty, *ESAIM: M2AN*, 2022, 56 (1), 349-83
63. D. Arnold, J. Guzmán, Local L2-Bounded commuting projections in FEEC, *ESAIM: M2AN*, 55 5 (2021) 2169-2184.
64. M. Fabien, J. Guzman, M. Neilan, A. Zytoon, Low-order divergence-free approximations for the Stokes problem on Worsey–Farin and Powell–Sabin splits, *Computer Methods in Applied Mechanics and Engineering*. 2022 Feb 15; 390:114444.
65. Burman E, Durst R, Fernández M, Guzmán J. Loosely coupled, non-iterative time-splitting scheme based on Robin-Robin coupling: Unified analysis for Parabolic/Parabolic and Parabolic/Hyperbolic problems. *J. Num. Math.*, 2023 Mar 28;31(1):59-77.
66. A. Salazar-Coariti, M. Fabien, J. Guzmán, J. McGuire, R. De Vita, K. Touissaint, Fluid mechanics approach to analyzing collagen fiber organization, *J. BioMed Optics*, 2022 Jan 1;27(1):016503-016503.
67. D. Boffi, S. Gong, J. Guzmán, M. Neilan, Convergence of Lagrange Finite Element methods for the Maxwell Eigenvalue Problem in 3D, *IMA*, 2023.
68. S. Gong, J. Guzmán, M. Neilan, A note on the shape regularity of Worsey-Farin Splits, *JSC*, 2023, 95(2):46.
69. G. Barrenechea, E. Burman, E. Caceres, J. Guzmán, Continuous Interior Penalty stabilization for divergence-free finite element methods, *IMA*, 2024 Mar;44(2):980-1002.
70. E. Burman, D. Garg, J. Guzmán, Implicit-explicit time discretization for Oseen's equation at high Reynolds number with application to fractional step methods, *SINUM*, 2023; 61 (6), 2859-2886.
71. S. Gong, J. Gopalakrishnan, J. Guzmán, M. Neilan, Discrete Elasticity Exact Sequences on Worsey-Farin splits, *ESIAM: M2AN*, 57(2023) 3373–3402.
72. T. Dupont, J. Guzmán, R. Scott, Obtaining higher-order Galerkin accuracy when the boundary is polygonally approximated, *J. Num. Math.* 2024 Oct 7(0).
73. Burman E, Durst R, Fernández M, Guzmán J, Ruz O, Robin-Robin loose coupling for incompressible fluid-structure interaction: non-linear setting and nearly-optimal error analysis, *Journal of Scientific Computing*. 2025 Aug;104(2):34.
74. Burman E, Durst R, Fernández MA, Guzmán J, Liu S. Estimates of discrete time derivatives for the parabolic-parabolic Robin-Robin coupling method. *Numerical Algorithms*. 2024 Aug 9:1-28.

75. Burman E, Durst R, Fernández MA, Guzmán J, Liu S. A second-order correction method for loosely coupled discretizations applied to parabolic–parabolic interface problems. *IMA Journal of Numerical Analysis*. 2024 Nov 7.
76. Gopalakrishnan J, Guzman J, Lee JJ. The Johnson-Křížek-Mercier elasticity element in any dimensions. *Journal of Numerical Mathematics*. 2025 Dec 19(0).
77. Burman E, Garg D, Guzman J. Implicit-explicit Crank-Nicolson scheme for Oseen's equation at high Reynolds number. *M3AS*, 2005. To appear.
78. Ern A, Guzmán J, Potu P, Vohralík M. Discrete Poincare inequalities: a review on proofs, equivalent formulations, and behavior of constants. *IMA Journal of Numerical Analysis*. 2025 Dec 1.
79. Ern A, Guzmán J, Potu P, Vohralík M. Local L2-bounded commuting projections using discrete local problems on Alfeld splits. *Found. Comp. Math.*, to appear.
80. Guzmán J, Potu P. A Framework for Analysis of DEC Approximations to Hodge-Laplacian Problems using Generalized Whitney Forms. *Math. Comp.*, to appear.
81. Eickmann F, Guzmán J, Neilan M, Ridgway Scott L, Tscherpel T. A local Fortin projection for the Scott-Vogelius elements on general meshes. *J. Num. Math.*, to appear.
82. Guzmán J, Hirani AN, Liu B, Potu P. Discrete Poincare and Bogovskii operators on cochains and Whitney forms. *arXiv preprint arXiv:2603.29018*. 2026 Mar 30.
83. Ern A, Guzmán J, Potu P. Bounded, commuting, discrete-trace preserving projections. *arXiv preprint arXiv:2604.28103*. 2026 Apr 30.
84. Guzmán J, Huang X. Low-regularity finite element elasticity complexes with hybridizable stresses on tetrahedral Alfeld splits. *arXiv preprint arXiv:2607.01933*. 2026 Jul 2.

Conference Proceedings

1. AC. Coariti, M. Fabien, J. Guzman, K.C. Toussaint, Quantitative second-harmonic generation imaging analysis based on fluid-dynamics measures. In *Frontiers in Optics* 2020 Sep 14 (pp. FW5E-1). Optical Society of America.

Selected Presentations

- Erwin Shrodinger Institute, Differential Complexes: Theory, Discretization, and Applications, May, 2026
- INRIA, Workshop: Robust adaptivity for nonlinear PDEs, Paris, Mar., 2026
- TSIMF, Workshop on Finite Element Tensor Calculus, Sanya, China, Jan, 2026
- International Conference on Structure-Preserving Finite Element Methods, Beijing, China, Jan, 2026
- Mexican Mathematical Society Annual meeting, Plenary talk, Puebla MX, Nov. 2025
- IMSI, Discrete Exterior Calculus workshop, Sept., Chicago, 2025
- EMS School on Applied Mathematics, Lectures on FEEC, Kacov, Czechia, June 2025
- LatMath conference at UCLA, Plenary talk, Los Angeles, March, 2025.
- CNMAC, mini-symposium talk, Porto Galinhas, Brazil, Sept. 2024
- Finite Element Fair, University of College London, June 2024
- ERC Nemesis Workshop, Universite Montpellier, France, June 2024.
- BIRS-UBCO, Homological Perspective on Splines and Finite Elements, May 2024
- Mathematical models and numerical methods for multi-physics systems, U. Pittsburgh, May 2024
- Finite element circus, Brown U., April 2024.
- Colloquium, Cornell Applied Math Colloquium, Dec. 2023
- Plenary Lecture, Modern math workshop held at SACNAS, Oct 2023
- Seminar, Texas A&M numerical seminar, Sept. 2023
- Colloquium, PRIME summer program, Pomona College, July 2023
- Plenary Lecture, AMS central sectional meeting, April 2023
- Seminar (Virtual), One world numerical analysis seminar, Mar. 2023.
- Seminar, INRIA-Paris, Oct. 2022.
- Seminar (Virtual), IIT-Roorke, Mar. 2022.
- Seminar (Virtual), Irish Numerical Analysis Forum, Feb. 2022.
- Mini-symposium (Virtual), AMS Fall Sectional Meeting, Omaha NE, Oct. 2021.
- Mini-symposium (Virtual), Mathematical Congress of the Americas, July 2021.
- Seminar, Australian seminar on computational mathematics, Mar. 2021
- Colloquium (Virtual), Mathematics Department, Howard University, Nov. 2020.
- Seminar (Virtual), Mathematics Department, Universidad de Colombia-Bogota, Nov. 2020.
- Seminar, STEM Jazz seminar, Brown University, Feb. 2020.
- Dynamics, Equations and Applications Conference, Krakow, Poland, Sept. 2019,
- Scientific computing seminar, University of Nottingham, Nottingham, U.K., Sept. 2019.
- 32nd Coloquio Brasileiro, mini-symposium talk, Aug. 2019, Rio de Janiero, Brazil.
- ICIAM, mini-symposium talk, July 2019, Valencia, Spain.
- Structure Preserving discretizations: FEMs, Splines and IGA, Pittsburgh, June 2019.
- Oxford University, Mathematical Institute, Oxford, UK, May 2019.
- SIAM TX-Louisiana sectional conference, LSU-Baton Rouge, Oct. 2018.
- Advances in PDEs: Theory, Computation and Application to CFD, ICERM, Aug. 2018.
- MSRI-UP colloquium, Berkeley, June 2018.

- SIAM Southeastern Atlantic sectional conference, UNC-Chapel Hill, March 2018.
- Applied and computational math colloquium, U. Minnesota, Feb. 2018.
- Scientific Computing around Louisiana (SCALA), LSU, Feb. 2018.
- Computational and Applied Mathematics Colloquium, U. Chicago, Nov. 2017.
- Modern Math Workshop (SACNAS), Salt Lake, Oct. 2017
- Recent Advances and Challenges in Discontinuous Galerkin Methods and Related Approaches, Minneapolis, June 2017.
- Blackwell-Tapia Conference, U. Tennessee, Oct. 2016
- Scientific computing seminar, Institut de Mathematiques de Bordeaux, Sept. 2016
- Computational and Applied Mathematics Seminar, U. Tennessee. Mar. 2016
- Scientific computing seminar, U. Houston, Mar. 2016
- Applied Mathematics Colloquium, NJIT, Jan. 2016
- SACNAS national conference, D.C., October 2015
- Three mini-symposium talks at ICIAM, Beijing, July 2015
- Advanced Numerical Methods in the Mathematical Sciences, Texas A & M, May 2015
- Numerical Methods for Partial Differential Equations, MIT, April 2015.
- Numerical Analysis Seminar, Universidad Nacional de Colombia- Bogota, Nov. 2014
- Structure Preserving Discretizations, IMA, Oct. 2014
- Durham LMS-EPSRC Symposium, Durham England, July 2014
- Robust Discretization and Fast Solvers for Computable Multi-Physics Models, ICERM, May 2014.
- Numerical Analysis Seminar, U. Pittsburgh, March. 2014
- Numerical Analysis Seminar, IISC, Bangalore, May 2013.
- Numerical analysis seminar, U. Maryland, Nov. 2012
- Mini-symposium talk, WCCM, Sao Paulo, July 2012
- Seminar, CIMNE, UPC, Barcelona, June 2012
- Numerical analysis seminar, U. Pittsburgh, Mar. 2012
- Numerical analysis seminar, Courant Institute, NYU, Nov. 2011
- Finite Element Circus, U. Connecticut, Oct. 2011
- Two mini-symposium talks at ICIAM, Vancouver, July 2011
- Numerical Methods for Incompressible Fluid Flow Workshop, UBC, Vancouver, July 2011
- Analysis and PDE Seminar, U. Delaware, March 2011.
- Mini-symposium presentation, SIAM annual meeting, Pittsburgh, July 2010
- Plenary talk, SIDIM, Univeristy of Puerto Rico-Mayagüez, Feb. 2009

- Mathematics Colloquium, WPI, Worcester, MA, Nov. 2009
- Applied Math Seminar, IMPA, Rio de Janeiro, Brazil, April 2009
- Three talks at MAFELAP, Brunel U., United Kingdom, June 2009
- Finite Element Circus, U. Delaware, DE, May 2009
- Applied Math Seminar, Michigan State U., East Lansing, MI, Mar. 2009
- Finite Element Circus, RPI, Troy, NY, Oct. 2008
- Computational and Applied Mathematics Seminar, UCI, Irvine, CA, April 2008
- Special Colloquium, Brown U., Providence, RI. Jan. 2008
- Special Colloquium, LSU, Baton Rouge, LA, Jan. 2008
- Numerical Analysis Seminar, Texas A&M, College Station, TX, Dec. 2007
- Special Colloquium, University of Illinois-Chicago, Chicago, IL, Dec. 2007
- BIRS meeting on DG methods, Banff, Alberta Canada, Nov. 2007
- Special Numerical Analysis/PDE seminar, U. of Kentucky, Lexington, KY, Sep. 2007
- Finite Element Circus, University of Maryland, College Park, MD, April 2007
- Computational and Applied Math Colloquium, Rice U., Houston, TX, April 2007
- Finite Element Circus, Penn State U., State College, PA, Nov. 2006
- DG mini-symposium, 7th World congress on computational mechanics, Los Angeles, CA, July 2007
- DG mini-symposium, AMS annual conference, Atlanta, GA, Jan. 2005
- Workshop on Numerical Approximations to PDE, Concepcion, Chile, Jan. 2004

Workshops or conferences attended (no talk given)

- Theory and Applications of discontinuous Galerkin methods, Oberwolfach, Feb. 2012
- Blackwell-Tapia conference, 2012, 2018.
- Mathematical Analysis of Turbulence, IPAM, Sep. 2014.
- SACNAS National Conferences, 2013, 2016, 2017.
- CAARMS, 2015.
- Pan-American Workshop Applied Mathematics and Computational Sciences, Varadero, Cuba, 2018.
- Celebrating 75 years of Mathematics of Computation, ICERM, Nov. 2018.
- Nonstandard FEM, Oberwolfach, Jan. 2021 (virtual).
- Research Group ICMS, Edinburgh, June 2024.

Grants

Completed Grants

- NSF, Division of Mathematical Sciences, Postdoctoral Research Fellowship, 2005-

- 2008, PI, \$108,000
- NSF, Division of Mathematical Sciences (SCREMS), # 0922803, 2009-2011, CO-PI, \$86,420
- CBMS/NSF (grant to organize workshop in June 2012), # DMS-1138011, 2012, PI, \$43,648
- NSF, Division of Mathematical Sciences, # 0914596, 2009-2012, PI, \$189,826
- NSA, REU Grant, # 003967, Summer 2014, PI, \$61,706
- ARO, Conference Grant, GR5212022, Dec. 2016, PI, \$14,950
- ONR, Conference Grant, GR5250018, Dec. 2016, PI, \$18,389
- AFOSR, Conference Grant, GR5210010, Dec. 2016, PI, \$ 23,201
- NSF, Division of Mathematical Sciences, Title: *Topics in the analysis of finite elements*, #1318108, 2013-2016, PI, \$210,000
- NSF, Division of Mathematical Sciences, Title: *Topics in Finite Element Analysis*, #1620100, 2016-2020, PI, \$210,000.
- NSF, Division of Mathematical Sciences, Title: *Finite Element exterior Calculus with smoother piecewise polynomial*, #1913083, 2019-2022, PI, \$300K.
- Brazil Collaboration Grant (Internal), Co-PI, \$19,576

Current Grants

- NSF, Division of Mathematical Sciences, Title: Higher order methods for fluid structure interaction problems, #2309606, 2023-2026, PI, \$343K.

Grants that were not funded

- NSF, RTG: Advanced Numerical Modeling: Analysis and Design, PI, \$2,671,188. Submitted in 2016.
- DOE, EPSCOR, Efficient high order numerical methods guided by optimization techniques for partial differential equations arising in energy sciences, PI, \$2,954,315, submitted March 2019.

Service

University Service

- Member of 2008 search committee for Prager Assistant Professor
- Applied mathematics library representative for 2009
- Mentor for Brown University's African, Latino, Asian and Native American (ALANA) mentoring program, 2008-2009 and 2009-2010
- Served on several Ph.d. thesis committees
- Given several prelim exams
- Concentration advisor, 2011-2013, 2021-
- First Year Advisor, 2011-2016, 2018-2019
- Graduate Committee member 2013-2017
- Graduate Director, 2017-2020
- IMSD Associate Director, 2016-2018
- Ran the Kobe-Brown Simulation School 2016.
- Member of the applied mathematics diversity and inclusion plan committee, 2016, Fall 2021.
- Ran two small REUs (four participants each summer) in summers of 2013 and 2014.
- Associate Chair, 2025-
- Prager Hiring Committee Chair (2025)
- AMPA's DEI committee member, 2025-
- Associate Chair, 2025-

Professional Service

- Editorial Board:
 - 1) Journal of Numerical Mathematics
 - 2) Journal of Scientific Computing (2014-2020)
 - 3) Mathematical Models and Methods in Applied Sciences (M3AS)
 - 4) Calcolo (2020-2026)
 - 5) La Matematica (2021-2026)
 - 6) IMA Journal on Numerical Analysis
- *Research Professor for MSRI-UP, summer 2026.*
- *EMS School Lectures, Kacov, Czechia, 2025*
- Co-organizer of an ICERM semester program: *Numerical PDES: Analysis, Algorithms and Data Challenges, 2024*
- Local organizer of the finite element circus, Spring 2024
- EDGE summer program, local co-organizer, summer 2023
- EDGE summer program, faculty mentor, summer 2020.

- SIAM Council Member, 2023-2025
- Reviewed a proposal for new master's program in a Chilean university
- Was part of the external review committee for PhD proposal for the math program in the University of Texas Rio Grande
- Co-organizer of the ICERM workshop Advances in PDEs: Theory, Computation and Application to CFD, ICERM, Aug. 2019.
- Co-organizer of BIRS workshop on Numerical analysis of coupled and multi-physics problems with dynamic interfaces, Oaxaca, July 2018.
- Co-taught a summer course in the Instituto de Matematicas UNAM-Queretaro, July 2018.
- Gave a mini course at the Modern Math workshop in SACNAS, Salt Lake, Oct. 2017.
- Co-taught a three week course in the African Institute of Mathematics-Senegal, Jan. 2017.
- Co-organizer of the conference *Frontiers in Applied and Computational Mathematics*, Providence, Jan. 2017.
- Co-organized mini-symposium at WONAPDE, Concepcion, Chile, Jan. 2016.
- AMS prize committee, 2014-2016
- AMS Birman Prize committee, 2021-2024
- AMS Committee on Meetings and Conferences, 2021-2024
- SIAM Dahlquist prize committee, 2020.
- Co-organizer of CBMS workshop on Finite element exterior Calculus, ICERM, Providence, June 2012
- Local organizer for Finite Element Circus Conference in the Spring 2010, Brown University
- Guest organizer of Finite Element Circus Fall 2010, IMA.
- Co-organized the DG mini-symposium in the 2009 MAFELAP conference, Brunel U., UK
- NSF panel member 2009, 2013, 2014, 2016, 2020, 2021 (CAREER award), 2025
- DOE panel member 2021 (CAREER award)
- Poster Judge at the 2006, 2007 and 2009 national conferences of the Society for the Advancement of Chicanos and Native-Americans in Science

Awards and Honors

2013	Comfort and Urry Family Fund Prize
2005	NSF Postdoctoral Fellowship
1999	Ford Foundation and Cornell-Sloan Fellowships
1999	CSULB's Outstanding Graduate in Mathematics

Teaching

Brown University

- Fall 2008, APMA 0340, Introduction to Differential Equations
- Spring 2009, Spring 2011, Spring 2017, APMA 1180, Introduction to Numerical Solution to Differential Equations
- Fall 2009, Fall 2011, Fall 2015 and Spring 2020, Fall 2023, APMA 2570, Numerical Solution to Partial Differential Equations III
- Spring 2010, Spring 2012, Spring 2014, Spring 2016, APMA 0160, Introduction to Scientific Computing
- Fall 2016, Fall 2020, Fall 2021, Fall 2022, APMA 2550, Numerical Solutions to Partial Differential Equations I
- Fall 2012, Fall 2018, APMA 1170, Computational Linear Algebra
- Fall 2013, APMA 1930L, Fast methods in scientific computing
- Fall 2014, Spring 2025, APMA 2580, Computational Fluid Dynamics
- Fall 2017, Spring 2024, APMA 2881X, Finite Element Exterior Calculus
- Spring 2021, APMA 1720, Monte Carlo Simulations with applications to Finance

University of Minnesota

- Calculus
- Sequences, Series and Foundations

Cornell University

- Calculus (as Ph.D Student)
- Real Analysis (in the Summer Math Institute)

African Institute of Mathematics-Sengal

- Introduction to numerical methods for elliptic PDEs. This was a three week course where students learned basic finite difference and finite element methods. This took place Jan. 2017 and was co-taught with Gerard Awanou.

Long term visitors

- Edwin M. Behrens, Catholic University of Concepcion-Chile, Fall 2009.
- Thirupathi Gudi, Indian Institute of Science, mid July- mid August of 2012.
- Alexandre Madureira, LNCC, Brazil, August 2015-July 2016.
- Marcus Sarkis, WPI, August 2015-July 2016.
- Douglas Arnold, UMN, Nov. 2016.
- Jay Gopalakrishnan, Portland State, Feb. 2018 (two weeks).
- Javier Sayas, U. Delaware, March-April 2018.
- Alexandre Ern, April 2023 (two weeks), Dec 2025 (two weeks)

Research Supervision

Past Ph.D. Students

- Manuel Sanchez-Uribe, Graduated May 2016

Thesis Title: Analysis and Development of Finite Element Methods for Interface Problems

First position: Dunham Jackson Assistant Professor at University of Minnesota

Current Position: Assistant Professor of Mathematics at the Catholic University of Chile, Santiago, Chile

- Filander Sequeira, Graduated Dec. 2015, Ph.D. granted by Universidad de Concepcion, Chile, co-advised with Gabriel Gatica

Thesis Title: Metodos de Elementos Finitos Mixtos y Afines para Problemas No-lineales y de Transmision en Mecanica de Medios Continuos.

First (and current) Position: Assistant Professor, Universidad Nacional de Costa Rica

- Anna Lischke, Graduated Aug. 2020

Thesis Title: Exact Smooth Piecewise Polynomial Sequences on Powell-Sabin and Worsey-Farin Splits.

First position: Mathworks, Software Engineer.

- Rebecca Durst, Graduated May 2022

Thesis Title: Recent advances in splitting methods based on Robin-Robin coupling conditions

First Position: Postdoc, University of Pittsburgh

- Ernesto Caceres, Graduated Aug. 2022

Thesis Title: Analysis and implementation of some stabilized finite element methods applied to fluid mechanics

First Position: Postdoc, Worcester Polytechnic University

- Sining Gong, Graduated May 2023

Thesis title: Applications of FEM with Macro-elements: discrete elasticity sequences and convergence of Lagrange elements for a maxwell eigenvalue problem

First Position: Postdoc, Michigan State University

Current Ph.D. Students

- Pratyush Potu, Fifth year student.

Postdocs (co)mentored

- Guosheng Fu, 2016-2019, Prager Postdoc.
- Maurice Fabien, 2019-2022, Prager Postdoc and Presidential Diversity Postdoc
- Sijing Liu, 2023-2024, ICERM Postdoc