CURRICULUM VITAE

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Catalin S. Trenchea

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Education

- **Ph.D.** in Mathematics, Iasi University, Romania, 2001.
  Dissertation title: *Optimal Control of Some Periodic Systems with Distributed Parameter*.
  Thesis advisor: Professor Viorel Barbu
- **M.Sc.** in Evolution Equations and Applications, Iasi University, Romania, September 1996.
- **M.Sc.** in Numerical Analysis and Optimization, Iasi University, Romania, June 1995.
- **B.S.** in Mathematics, Iasi University, Romania, June 1994.

Mathematical Interests

Numerical Analysis, Control Theory, Partial Differential Equations

Research Grants Awarded

- PI: National Science Foundation (NSF) - "Large Eddy Simulations in Magnetohydrodynamics Flows", 2015- 2018, $182,977.
- PI (*Co-PI: William Layton*): Mathematics Research Center (University of Pittsburgh): "Time-filters and predictive accuracy", 2018, $15,000.
- PI: Air Force Office of Scientific Research (AFOSR) - "Mathematical Methods for Predictive Simulation of Stochastic Turbulence Systems", 2015-2016, $27,234.
- PI (*Co-PI: William Layton*): Mathematics Research Center (University of Pittsburgh), Institute for Mathematics and its Applications (University of Minnesota) : "Numerical Analysis and Predictability of Fluid Motion", 2015, $20,000.
- PI (*Co-PI: William Layton*): Air Force Office of Scientific Research (AFOSR) - "Generalized Mathematical and Computational Methods for Predictive Simulation of Stochastic Turbulence Systems", 2011-2014, $404,448.
- PI: Air Force Office of Scientific Research (AFOSR) -"Advanced Numerical Methods for Computing Statistical Quantities of Interest from Solutions of SPDEs", 2009-2011, $140,821.
- PI: FY09 CRDF, University of Pittsburgh - "Computation and control of biological pattern formation", 2008.
- PI: Grant of Department of Education and Research, Romania 2001.
- PI: Grant of National Agency for Science, Technology and Information, Romania 2000.
- PI: Grant of National Agency for Science, Technology and Information, Romania 1999.

Employment

- **Professor** at the Department of Mathematics, University of Pittsburgh, September 2020 - present.
- **Associate Professor** at the Department of Mathematics, University of Pittsburgh, September 2013 - August 2020.
- **Assistant Professor** at the Department of Mathematics, University of Pittsburgh, 2006 - 2013.

- **Postdoctoral Research Associate** (Numerical Analysis) at the School of Computational Science, Florida State University, October 2003 - November 2006.
  Host: Professor Max D. Gunzburger
- **Postdoctoral Researcher** (Optimal Control Theory) at the Department of Mathematics, University of Bretagne Occidentale, Brest, France, January 2003–July 2003. Host: Professor Marc Quincampoix
- **Postdoctoral Fellow** (Fluid Mechanics and Control), Department of Mechanics and Aerospace Engineering, University of California, San Diego, May 2001–December 2001. Host: Professor Thomas R. Bewley
- **Research Scientist**, Institute of Mathematics of Romanian Academy, Iasi Romania, 1998-2000
- **Teaching Assistant**, Department of Mathematics, Iasi University, Romania, 1996–2000

** Member of the Editorial Board of the International Journal of Applied Nonlinear Science (IJANS), and ROMAI journal.*
** Affiliated Faculty at the Department of Scientific Computing, The Florida State University.*
** Member of the Steering Committee of the Southeastern Atlantic Regional Conference on Differential Equations.*

Publications since promotion to Associate Professor

1. Martina Bukač, Anyastassia Seboldt and Catalin Trenchea, "Refactorization of Cauchy's method: a second-order partitioned method for fluid-thick structure interaction problems", submitted.
2. John Burkardt and Catalin Trenchea, "Refactorization of the midpoint rule", *Applied Mathematics Letters* 107 (2020), 106438.
   https://www.mathematics.pitt.edu/sites/default/files/midpoint3_technicalreport.pdf.
3. William Layton, Wenlong Pei, Yi Qin and Catalin Trenchea, "Analysis of the variable step method of Dahlquist, Liniger and Nevanlinna for fluid flow", (*in review*).
   https://www.mathematics.pitt.edu/sites/default/files/2020_01January_DLN.pdf.
4. Fasma Diele, Angela Martiradonna and Catalin Trenchea, "Stability, errors estimates and positivity of a second-order implicit-symplectic (IMSP) scheme", submitted.
5. Martina Bukač and Catalin Trenchea, "Boundary update using resolvent for fluid-structure interaction", *Journal of Numerical Mathematics* (2020).
   https://www.mathematics.pitt.edu/sites/default/files/BOUR_technicalReport.pdf.
6. Catalin Trenchea, "Partitioned conservative, variable step, second-order method for magneto-hydrodynamics in Elsässer variables", *ROMAI Journal* 15 (2019), no. 2, 117-137.
   https://rj.romai.ro/index.php?option=com_content&view=article&id=81&Itemid=16.
7. Vincent Ervin, Michaela Kubacki, William Layton, Marina Moraiti, Z. Si, Catalin Trenchea, "Partitioned penalty methods for the evolutionary Stokes-Darcy-transport problem", *Numerical Methods for Partial Differential Equations* 35 (2019), no. 1, 349-374.
   https://doi.org/10.1002/num.22303.
8. Martina Bukač, Oyekola Oyekole and Catalin Trenchea, "A second-order in time approximation of fluid-structure interaction problem", *SIAM J. Numer. Anal.* 56 (2018), no. 1, 590-613.
   https://epubs.siam.org/doi/10.1137/17M1140054.
9. Ahmet Guzel and Catalin Trenchea, "The Williams step increases the stability and accuracy of the hoRA time filter" *Applied Numerical Mathematics* 131 (2018), 158-173.
   https://www.sciencedirect.com/science/article/pii/S0168927418301132?via%3Dihub.
10. Yong Li, Catalin Trenchea, "Existence and ergodicity for the two-dimensional stochastic Boussinesq equation", *International Journal of Numerical Analysis and Modeling* 15 (2018), no. 4-5, 715-728.
    http://www.math.ualberta.ca/ijnam/Volume-15-2018/No-4-18/2018-45-14.pdf.

11. Yong Li and Catalin Trenchea, “Partitioned second order method for magnetohydrodynamics in Elsässer fields" *Discrete & Continuous Dynamical Systems - B* 23 (2018), no. 7, 2803-2823.
http://aimsciences.org//article/doi/10.3934/dcdsb.2018106.

12. Fasma Diele, Marcus R. Garvie, and Catalin Trenchea, “Analysis of second-order in time implicit-symplectic scheme for predator-prey systems", technical report (2018) University of Pittsburgh.
https://www.mathematics.pitt.edu/research/technical-reports.

13. Costica Morosanu, Silviu Paval and Catalin Trenchea, “Analysis of stability and error estimates for three methods approximating a nonlinear reaction-diffusion equation", *Journal of Applied Analysis and Computation* 7 (2017), no. 1,1-19.
http://jaac.ijournal.cn/ch/reader/view_abstract.aspx?doi=10.11948/2017001.

14. Fasma Diele, Marcus R. Garvie, and Catalin Trenchea, “Analysis of first-order in time implicit-symplectic scheme for predator-prey systems", *Computers & Mathematics with Applications* 74 (2017), no. 5, 948-961.
https://www.sciencedirect.com/science/article/pii/S0898122117302614?via%3Dihub.

15. William Layton, Yong Li and Catalin Trenchea, “Recent Developments in IMEX Methods with Time Filters for Systems of Evolution Equations", *Journal of Computational and Applied Mathematics* 299 (2016), 50–67.
https://www.sciencedirect.com/science/article/pii/S0377042715005105?via%3Dihub.

16. Nan Jiang, Muhammad Mohebujjaman, Leo G. Rebholz, and Catalin Trenchea, “An optimally accurate discrete regularization for second order timestepping methods for Navier-Stokes equations", *Computer Methods in Applied Mechanics and Engineering* 310 (2016), 388-405.
https://www.sciencedirect.com/science/article/pii/S0045782516307587?via%3Dihub.

17. Catalin Trenchea, “Second order implicit for local effects and explicit for nonlocal effects is unconditionally stable", *ROMAI J.*, 12 (2016), no. 1, 163–178.
https://rj.romai.ro/arhiva/2016/1/Trenchea.pdf.

18. Roxana Tanase, Catalin Trenchea, and Ivan Yotov, “Optimal Control of Systems Governed by PDEs with Random Parameter Fields", technical report (2016) University of Pittsburgh.
https://www.mathematics.pitt.edu/research/technical-reports.

19. Vincent J. Ervin, Michaela Kubacki, William Layton, Marina Moraiti, Zhiyong Si, Catalin Trenchea, “On limiting behavior of contaminant transport models in coupled surface and groundwater flows", *Axioms* 4 (2015), 518-529.
https://www.mdpi.com/2075-1680/4/4/518.

20. Martina Bukač, William Layton, Catalin Trenchea, Marina Moraiti, Hoang Tran, “Analysis of partitioned methods for Biot system", *Numerical Methods for Partial Differential Equations* 31 (2015), no. 6, 1769-1813.
https://onlinelibrary.wiley.com/doi/full/10.1002/num.21968.

21. Nicholas Wilson, Alexander Labovsky, Catalin Trenchea, “High accuracy method for magnetohydrodynamics system in Elsässer variables", *Comput. Methods Appl. Math.* 15 (2015), no. 1, 97-110.
https://www.degruyter.com/view/j/cmam.2015.15.issue-1/cmam-2014-0023/cmam-2014-0023.xml.

22. Yong Li, Catalin Trenchea, A higher-order Robert-Asselin type time filter, *Journal of Computational Physics* 259C (2014), 23–32.
https://www.sciencedirect.com/science/article/pii/S0021999113007845?via%3Dihub.

23. Leo Rebholz, Keith Galvin, Catalin Trenchea, Efficient, unconditionally stable, and optimally accurate FE algorithms for approximate deconvolution models, *SIAM J. Numer. Anal.* 52 (2014), no. 2, 678-707.
https://epubs.siam.org/doi/10.1137/120887412.

24. William Layton, Hoang Tran and Catalin Trenchea, Numerical Analysis of two partitioned methods for uncoupling evolutionary MHD flows, *Numerical Methods for Partial Differential Equations* 30 (2014), no. 4, 1083-1102.
https://onlinelibrary.wiley.com/doi/full/10.1002/num.21857.

25. Hoang A. Tran, Catalin Trenchea, Clayton G. Webster, A convergence analysis of stochastic collocation method for Navier-Stokes equations with random input data", *ORNL Technical Report*, Oak Ridge National Laboratory, 2014. https://web.ornl.gov/~tranha/SCreport.pdf.

26. Nicholas Hurl, William Layton, Yong Li, Catalin Trenchea, Stability Analysis of the Crank-Nicolson-Leap-Frog method with the Robert-Asselin-Williams time filter, *BIT. Numerical Mathematics* 54 (2014), no. 4, 1009-1021. https://link.springer.com/article/10.1007%2Fs10543-014-0493-1.

27. Catalin Trenchea, Unconditional stability of a partitioned IMEX method for magnetohydrodynamic flows, *Applied Mathematical Letters* 27 (2014), 97–100. https://www.sciencedirect.com/science/article/pii/S0893965913002073?via%3Dihub.

28. Catalin Trenchea, Stability of partitioned IMEX methods for systems of evolution equations with skew-symmetric coupling, *ROMAI J.*, 10 (2014), no. 2, 175–189. https://rj.romai.ro/arhiva/2014/2/Trenchea.pdf.

29. M.R. Garvie and Catalin Trenchea, A Three Level Finite Element Approximation of a Pattern Formation Model in Developmental Biology, *Numer. Math.* 127 (2014), no. 3, 397–422. https://link.springer.com/article/10.1007%2Fs00211-013-0591-z.

30. M.R. Garvie, Catalin Trenchea, Identification of space-time distributed parameters in the Gierer-Meinhardt reaction-diffusion system, *SIAM J. Appl. Math.* 74 (2014), no. 1, 147-166. https://epubs.siam.org/doi/10.1137/120885784.

31. W. Layton, N. Mays, M. Neda and C. Trenchea, Numerical analysis of modular regularization methods for the BDF2 time discretization of the NSE, *ESAIM Math. Model. Numer. Anal.* 48 (2014), no. 3, 765-793. https://www.esaim-m2an.org/articles/m2an/abs/2014/03/m2an130120/m2an130120.html.

32. W. Layton, H. Tran and C. Trenchea, Analysis of Long Time Stability and Errors of Two Partitioned Methods for Uncoupling Evolutionary Groundwater - Surface Water Flows, *SIAM J. Numer. Anal.* 51 (2013), no. 1, 248–272. https://epubs.siam.org/doi/10.1137/110834494.

33. Max Gunzburger, Catalin Trenchea and Clayton G. Webster, Error estimates for a stochastic collocation approach to identification and control problems for random elliptic PDEs, preprint (2013). http://www.pitt.edu/~trenchea/sInverse_techreport.pdf.

Publications while at Assistant Professor level

34. A. Bowers, L. Rebholz, A. Takhirov and C. Trenchea, Improved accuracy in regularization models of incompressible flow via adaptive nonlinear filtering, *Int. J. Numer. Meth. Fluids.* 70 (2012), no. 7, 805-828. https://onlinelibrary.wiley.com/doi/full/10.1002/fld.2732.

35. W. Layton, L. Rebholz and C. Trenchea, Modular Nonlinear Filter Stabilization of Methods for Higher Reynolds Numbers Flow, *J. Math. Fluid Mech.*, 14 (2012), no. 2, 325-354. https://link.springer.com/article/10.1007%2Fs00021-011-0072-z.

36. W. Layton and C. Trenchea, Stability of two IMEX methods, CNLF and BDF2-AB2, for uncoupling systems of evolution equations, *Applied Numerical Mathematics*, 62:2 (2012) 112-120. https://www.sciencedirect.com/science/article/pii/S0168927411001930?via%3Dihub.

37. W. Layton, I. Stanculescu and C. Trenchea, Theory of the NS-$\overline{\omega}$ model: A complement to the NS-α model, *Communications on Pure and Applied Analysis*, 10 (2011), 1763-1777. http://www.aimsciences.org/journals/displayArticlesnew.jsp?paperID=6238.

38. W. Layton and C. Trenchea, The Das-Moser commutator closure for filtering through a boundary is well-posed, *Mathematical and Computer Modelling*, 53 (2011), 566-573. https://www.sciencedirect.com/science/article/pii/S0895717710004358?via%3Dihub.

39. A. Labovsky and C. Trenchea, Large eddy simulation for turbulent MHD flows, *J. Math. Anal. Appl.*, 377 (2011) 516-533.
https://www.sciencedirect.com/science/article/pii/S0022247X10009170?via%3Dihub.

40. A. Labovsky and C. Trenchea, Approximate Deconvolution Models for Magnetohydrodynamics, *Numer. Funct. Anal. Optim.,* 31:12, 1362-1385 (2010).
https://www.tandfonline.com/doi/abs/10.1080/01630563.2010.528570.

41. M.R. Garvie, P. Maini, C. Trenchea, An efficient and robust numerical algorithm for estimating parameters in Turing systems, *Journal of Computational Physics*, 229 (2010) 7058-7071.
https://www.sciencedirect.com/science/article/pii/S0021999110003128?via%3Dihub.

42. W. Layton, M. Sussman, C. Trenchea, Bounds on Energy, Magnetic Helicity and Cross Helicity Dissipation Rates of Approximate Deconvolution Models of Turbulence for MHD Flows, *Numer. Funct. Anal. Optim.*, 31:5, (2010) 577-595.
https://www.tandfonline.com/doi/abs/10.1080/01630563.2010.489249.

43. Max Gunzburger, Eunjung Lee, Yuki Saka, Catalin Trenchea and Xiaoming Wang, Analysis of Nonlinear Spectral Eddy-Viscosity Models of Turbulence, *J. Sci. Comp.* Vol. 45, No. 1-3 (2010) 294-332.
https://link.springer.com/article/10.1007%2Fs10915-009-9335-8.

44. Marcus R. Garvie and Catalin Trenchea, Spatiotemporal dynamics of two generic predator-prey models, *Journal of Biological Dynamics*, 4:6, (2010) 559-570.
https://www.tandfonline.com/doi/abs/10.1080/17513750903484321.

45. A. Labovschii, W. Layton, C. Manica, M. Neda, L. Rebholz, I. Stanculescu and C. Trenchea, "Mathematical Architecture of Approximate Deconvolution Models of Turbulence", J. Meyers, B. Geurts and P. Sagaut (Eds.) ERCOFTAC Series, vol 12. Springer, Dordrecht, (2008).
https://link.springer.com/chapter/10.1007/978-1-4020-8578-9_1.

46. Max Gunzburger, Janet Peterson, Catalin Trenchea, The velocity tracking problem for MHD flows with distributed magnetic field controls. *Int. J. Pure Appl. Math.* 42 (2008), no. 2, 289-296.
https://ijpam.eu/contents/2008-42-2/18/18.pdf.

47. Marcus R. Garvie and Catalin Trenchea, Optimal control of a 'nutrient-phytoplankton-zooplankton-fish' system, *SIAM J. Control Optim.*, 46 (2007) 775-791.
https://epubs.siam.org/doi/10.1137/050645415.

48. Marcus R. Garvie and Catalin Trenchea, Finite element approximations of spatially extended predator-prey interactions with the Holling type II functional response, *Numer. Math.* 107 (2007), no.4, 641-667.
https://link.springer.com/article/10.1007%2Fs00211-007-0106-x.

Publications before coming to the University of Pittsburgh

49. Max Gunzburger and Catalin Trenchea, Analysis of an optimal control problem for the three-dimensional coupled modified Navier-Stokes and Maxwell equations, *J. Math. Anal. Appl.*, no. 333 (2007), 295-310.
https://www.sciencedirect.com/science/article/pii/S0022247X06011656?via%3Dihub.

50. Max Gunzburger and Catalin Trenchea, Analysis and Discretization of an Optimal Control Problem for the Time-Periodic MHD Equations, *J. Math. Anal. Appl.* 308 (2005), no. 2, 440-466.
https://www.sciencedirect.com/science/article/pii/S0022247X04009291?via%3Dihub.

51. Catalin Trenchea, Optimal control of an elliptic equation under periodic conditions, *Mem. Secţ. Ştiint. Acad. Române* Ser. IV 25 (2002), 23–35 (2005).
http://www.math.pitt.edu/~trenchea/papers/ocee.pdf.

52. Catalin Trenchea, Periodic optimal control of the Boussinesq equation, *Nonlinear Anal., Theory Methods Appl.* 53A, No.1, 81-96 (2003), 81-96.
https://www.sciencedirect.com/science/article/pii/S0362546X02002961?via%3Dihub.

53. C. Trenchea, “Internal optimal control of the periodic Euler-Bernoulli equation", *Commun. Appl. Anal*. 7 (2003), no. 1, 115–125.
http://www.math.pitt.edu/~trenchea/papers/ocEB.pdf.

54. M. Quincampoix and C. Trenchea, Hamilton-Jacobi equation and optimality conditions for control systems governed by semilinear parabolic equations with boundary control, tech. rep., Université de Bretagne Occidentale, 2003.
http://www.math.pitt.edu/~trenchea/papers/HJE.pdf.

55. Costica Moroşanu and Catalin Trenchea, Identification for nonlinear periodic wave equation, *Appl. Math. Optimization,* 44 (2001), 87–104.
https://link.springer.com/article/10.1007%2Fs00245-001-0015-9.

56. Catalin Trenchea, Optimal control of the periodic string equation with internal control, *J. Optim. Theory Appl.*, 101 (1999), 429–447.
https://link.springer.com/article/10.1023%2FA%3A1021797712428.

Papers in Conference Proceedings

57. Yong Li, Catalin Trenchea, "Analysis of time filters used with the leapfrog scheme", Proceedings of the VI Conference on Computational Methods for Coupled Problems in Science and Engineering, Venice, Italy, May 18-20, 2015, pp. 1261-1272.
http://www.mathematics.pitt.edu/sites/default/files/SurveyTimeFilters1_technical-report.pdf.

58. William Layton, Hoang Tran and Catalin Trenchea, Stability of partitioned methods for magnetohydrodynamics flows at small magnetic Reynolds number, in Recent Advances in Scientific Computing and Applications: Proceedings of the 8th International Conference on Scientific Computing and Applications, Eds. Jichun Li, Eric Macharro, and Hongtao Yang, AMS Contemporary Mathematics, vol. 586 2013.
http://www.math.pitt.edu/~trenchea/papers/AMSrmhd_2012_05May_04.pdf.

59. Marcus R. Garvie and Catalin Trenchea, ‘Biomanipulation of food-webs in eutrophic lakes’, *Proceedings of the 46th IEEE Conference on Decision and Control*, (2007), pp. 3460-3465.
https://ieeexplore.ieee.org/document/4435049.

60. Max Gunzburger and Catalin Trenchea, Optimal control of time-periodic MHD equations, *Nonlinear Anal., Theory Methods Appl.*, 63 (2005), no. 5-7, e1687-e1699, Proceedings for the Fourth World Congress of Nonlinear Analysis WCNA-2004.
https://www.sciencedirect.com/science/article/pii/S0362546X05001859.

61. Thomas Bewley and Catalin Trenchea, Noncooperative optimization of controls for time periodic Navier-Stokes systems with multiple solutions, *AIAA 2002-2754*.
https://www.researchgate.net/publication/268558856_Noncooperative_Optimization_of_Controls_for_Time-Peri

Conferences organized

1. Co-organized with John Burkardt and William Layton the Workshop “Computational Mathematics trends in science and engineering", 2020, University of Pittsburgh.

2. Co-organized with Xiaoming Wang the Minisymposium “Numerical methods for multi-physics coupled problems", International Congress on Industrial and Applied Mathematics 2019, Valencia Spain.

3. Co-organized with William Layton the Workshop “Time-filters and predictive accuracy", 2019, University of Pittsburgh.

4. Co-organized with Martina Bukač the Minisymposium “Numerical methods for coupled problems involving fluids and solids", 6th European Conference on Computational Mechanics, 7th European Conference on Computational Fluid Dynamics 2018, Glasgow UK.

5. Co-organized with William Layton the Workshop “FreeFEM++ Workshop: Powering Research where Analysis Meets Applications", August, 2017, University of Pittsburgh.

6. Co-organized with William Layton the MRC/IMA conference on Numerical Analysis and Predictability of Fluid Motion, University of Pittsburgh, May 3-4 2016.

7. Co-organized the SIAM Student Conference 2012, held at Virginia Tech, March 2012.

8. Co-organized with Xiaoming Wang (FSU) and Yanzhao Cao (Auburn U) the Special Session on Analysis and Control under Uncertainty, held at the Joint Mathematics Meeting, San Francisco, January 13-16, 2010.

9. Co-organized the SIAM Student Conference 2010, held at Virginia Tech, February 2010.

10. Co-organized the Clemson/Pitt/UTK/VT Graduate/Post Graduate Conference 2009, held at ICAM, Virginia Tech, February 2009.

11. Co-organized with Marcus Garvie (University of Guelph) at the SIAM Conference on Computational Science and Engineering, the Minisymposium - MS149 “Distributed Parameter Identification Problems”, Miami FL, March 2009.

Conferences and Presentations

- *Magnetohydrodynamics: symplectic, unconditionally stable, energy conserving, second order accurate, time-adaptive partitioning*, Finite Element Circus, Virginia Polytechnic Institute, Blacksburg VA, 2019.

- *BOundary Update via Resolvent for fluid-structure interaction*, International Conference on Scientific Computation and Differential Equations, Innsbruck Austria, 2019.

- *BOundary Update via Resolvent for fluid-structure interaction*, International Congress on Industrial and Applied Mathematics 2019, Valencia Spain.

- *Partitioned algorithms for evolutionary partial differential equations*, Colloquium, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, IN, November 2018.

- *A functional analysis approach to the existence of 2D stochastic NSE*, CNA working group: Stochastic PDEs, Carnegie Mellon University, May 2018.

- *Second-Order in Time Approximations of Fluid Structure Interactions*, Finite Element Circus, University of Tennessee, March 2018, Knoxville TN.

- *Inverse Problems Matching Statistical Moments in PDEs with Random Data*, SIAM Conference on Computational Science and Engineering, (invited speaker) mini-symposium <MS292 Stochastic Optimization with Differential Equations: Methods and Applications>, March 2017, Atlanta GA.

- *Parameter Identification for PDEs with Random Data*, (invited speaker) at the Conference on Parameter Estimation and Uncertainty Quantification for Dynamical Systems, University of Pittsburgh, March 2017.

- *Parameter Identification for systems governed by PDEs with Random Data*, invited speaker at the 9th Workshop SDS 2016 "Structural Dynamical systems: Computational Aspects", Capitolo, Monopoli, Italy June 2016.

- *Identification problems for random elliptic PDEs*, poster at the workshop "Computational Methods for Control of Infinite-dimensional Systems", Institute for Mathematics and Applications, University of Minnesota, March 2016.

- *Error estimates for inverse problems matching statistical moments in random elliptic PDEs*, Applied Mathematics Seminar, University of Pittsburgh, January 2016.

- *Parameter Identification for PDEs with Random Data*, SIAM Conference on Analysis of Partial Differential Equations Advances in Theoretical and Numerical Analysis of parametrized PDEs in High Dimensions, Scottsdale AZ, December 2015.

- *A generalized stochastic collocation approach to constrained optimization for random data*, Advances in Scientific Computing and Applied Mathematics, Las Vegas, Nevada, October 2015.

- *Partitioned second-order method for magnetohydrodynamics in Elsässer fields*, "Decoupling methods for multi-physics and multi-scale problems", 8th International Congress on Industrial and Applied Mathematics, Beijing China, August 2015.
- *Generalized Mathematical and Computational Approaches for Predictive Simulation of Stochastic Turbulent Systems*, Computational Math Annual Review, Arlington VA, July 2015.
- *A higher-order Robert-Asselin type time filter in the semi-explicit integrations*, "VI International Conference on Coupled Problems in Science and Engineering", Venice IT, May 2015.
- *Partitioned second-order method for magnetohydrodynamics in Elsässer fields*, "Developments of numerical methods and computations for fluid flow problems", AMS Spring Western Section Meeting, Las Vegas, NV, April 2015.
- *Partitioned second-order method for magnetohydrodynamics in Elsässer fields*, "Recent Advances in Numerical Methods for Partial Differential Equations", AMS Southeastern Sectional Meeting, University of Alabama in Huntsville, March 2015.
- *Constrained optimization for random data identification problems*, SIAM SEAS 2015, MS7 "Optimal Control, Optimization, Inverse problems and Numerical Simulations with Applications", Birmingham AL, March 2015.
- *A higher-order Robert-Asselin type time filter*, University of Iasi, Romania, June 2014.
- *Generalized Mathematical and Computational Approaches for Predictive Simulation of Stochastic Turbulent Systems*, Computational Math Annual Review, Arlington VA, July 2014.
- *A higher-order Robert-Asselin type time filter*, International Conference on Engineering and Computational Mathematics (ECM2013), Hong Kong, December 2013.
- *Improving Time-Stepping Numerics for Weakly Dissipative Systems*, Oak Ridge National Laboratory, TN, July 2013.
- *Generalized Mathematical and Computational Approaches for Predictive Simulation of Stochastic Turbulent Systems*, Computational Math Annual Review, Arlington VA, July 2013.
- *The Mixed Finite Element Method for Parameter Identification in Porous Media*, MS76 Recent Advances in NM for PDEs w/ Random Inputs, SIAM Annual Meeting, San Diego, July 2013.
- *An adaptive sparse grid stochastic collocation method for high-dimensional random field identification problems*, SIAM CSE, February 27, 2013.
- *Time-stepping for weakly dissipative systems*, Computational Mathematics Seminar, University of Pittsburgh, October 30, 2012.
- *Mathematical and Computational Methods for Predictive Simulation of Evolution Systems*, Colloquium at Department of Mathematics, University of Pittsburgh, October 12, 2012.
- *Acceleration Through Uncoupling and Timestepping*, Computer Science and Mathematics Division Seminar, Oak Ridge National Laboratory, TN, August 2012.
- *Generalized Mathematical and Computational Approaches for Predictive Simulation of Stochastic Turbulent Systems*, AFOSR Computational Mathematics Program Review, Arlington VA, July 2012.
- *Truncation of scales by time relaxation in MHD turbulence*, SIAM Annual Meeting (invited talk), Minneapolis, Minnesota, July 2012.
- *A stochastic collocation approach to constrained optimization for random data estimation problems*, SIAM Conference on Uncertainty Quantification, Raleigh, NC, April 2012.
- *Generalized Methodology for Inverse Modeling Constrained by SPDEs*, SIAM Conference on Uncertainty Quantification (invited talk), Raleigh, NC, April 2012.
- *A stochastic collocation approach to constrained optimization for random data estimation problems*, Computational Mathematics Seminar, University of Pittsburgh, January 24, 2012.

- *A stochastic collocation approach to constraint optimization for random data estimation problems*, Fields Industrial Optimization Seminar, Fields Institute for Research in Mathematical Sciences (invited), Toronto, Ontario, Canada, December 6, 2011.
- *A stochastic collocation approach to constraint optimization for random data estimation problems*, Department of Mathematics & Statistics Seminar, McMaster University, Ontario, Canada, December 5, 2011.
- *Modular regularization methods for Higher Reynolds Numbers flow*, Department of Mathematical Sciences Colloquium, Michigan Technological University, Mi, October 24, 2011.
- *Stability of two IMEX methods, CNLF and BDF2-AB2, for uncoupling systems of evolution equations*, Applied Mathematics, Modeling and Computational Science (invited), Waterloo, Canada, July 2011.
- *Analysis of long time stability and errors of two stable partitioned methods for uncoupling evolutionary groundwater-surfacewater flows*, Applied Mathematics, Modeling and Computational Science (invited), Waterloo, Canada, July 2011.
- *A new algorithm for estimating parameters in reaction-diffusion systems that display pattern formation*, Applied Mathematics, Modeling and Computational Science (invited), Waterloo, Canada, July 2011.
- *Stability of two IMEX methods, CNLF and BDF2-AB2, for uncoupling systems of evolution equations*, "Advances in modeling, numerical analysis and computations of fluid flow problems", AMS Spring Western Section Meeting (invited), Las Vegas, NV, April 2011.
- *An efficient and robust numerical algorithm for estimating parameters in Turing systems*, AMS-SIAM Joint Mathematics Meetings, Special Session on Control and Inverse Problems for Partial Differential Equations (invited), New Orleans LA, January 2011.
- *An efficient and robust numerical algorithm for estimating parameters in Turing systems*, SEARCDE (invited), Blacksburg, VA, October 2010.
- *An efficient and robust numerical algorithm for estimating parameters in Turing systems*, SIAM Annual Meeting & Conference on Life Sciences (invited), Pittsburgh PA, July 2010.
- *Bounds on Energy, Magnetic Helicity and Cross Helicity Dissipations Rates of Approximate Deconvolution Models of Turbulence for MHD Flows*, SIAM meeting "Emerging Topics in Dynamical Systems and Partial Differential Equations" (contributed), Barcelona Spain, June 2010.
- *Bounds on Energy, Magnetic Helicity and Cross Helicity Dissipations Rates of Approximate Deconvolution Models of Turbulence for MHD Flows* and *Optimal Control of MHD Flows*, Naval Postgraduate School (invited), Monterey CA, May 2010.
- *Optimal Control under SPDE constraint*, Minisymposium on inverse problems (invited), University of Guelph, August 19-20, 2009.
- *Optimal Control under SPDE constraint*, SIAM Conference on Control and Its Applications (CT09), (invited) Denver CO, July 6-8, 2009.
- *A Controllability Problem in Pattern Formation*, Conference on Computational Science and Engineering (invited), March 6, 2009, Miami FL.
- *Computational Methods for SPDE Control Problems* 8th World Congress on Computational Mechanics, 5th European Congress on Computational Methods in Applied Sciences and Engineering (contributed), Venice, Italy, June 30 - July 4, 2008.
- *Magnetohydrodynamics: control and large eddy simulations*, Department of Mathematics and Statistics Colloquium, University of Guelph, April 17, 2008.
- *Control and parameter identification in reaction-diffusion equations*, School of Mathematics and Physics Seminar, University of Queensland, Australia, March 20, 2008.

- *Control and parameter identification in reaction-diffusion equations*, School of Mathematics and Statistics, Applied Mathematics Seminar, University of Sydney, Australia, March 19, 2008.
- *Magnetohydrodynamics: optimal control and turbulence*, Department of Mathematics Colloquia, University of Toledo, OH, February 22, 2008.
- *Biomanipulation of Food-Webs in Eutrophic Lakes*, 46th IEEE Conference on Decision and Control (invited), December 12-14, 2007, New Orleans, Louisiana.
- *Velocity tracking for MHD flows with magnetic field controls*, Fourth International Conference of Applied Mathematics and Computing (invited), August 12-18, 2007, Plovdiv, Bulgaria.
- *Parameter identification for reaction-diffusion equations modeling pattern formation* SIAM Conference on Control and Its Applications (invited), June 29 - July 1, 2007, in San Francisco, California.
- *Optimal control of time-periodic MHD equations*, Mathematical Association of Americam 85th Annual Meeting (invited), 31 March - 1 April 2006, Auburn, Alabama.
- *Velocity and magnetic field tracking for MHD flows with distributed controls*, ICAM Workshop on Mathematics as an Enabling Science (invited), 30 September - 02 October 2005, Virginia Tech, Blacksburg, VA.
- *Optimal Control of a Plankton-Fish System*, SIAM Conference on Control and its Applications (invited), July 11-14, 2005, New Orleans, LA.
- *Analysis and discretization of an optimal control problem for the time-periodic MHD equations*, SIAM Conference on Computational Science and Engineering (invited), February 12-15, 2005, Orlando Florida.
- *Analysis and discretization of an optimal control problem for the time-periodic MHD equations*, (invited) Colorado State University, February 10, 2005.
- *Analysis and discretization of an optimal control problem for the time-periodic MHD equations*, (invited) University of Nebraska-Lincoln, January 20, 2005.
- *Optimal control of time-periodic MHD equations*, Fourth World Congress of Nonlinear Analysis (invited), June 30 - July 7, 2004, Orlando Florida.
- *Optimal control of the time-periodic MHD equations*, University of Wyoming Mathematics Department Colloquium, May 6th, 2004.
- *Value function and optimality conditions for a boundary control problem*, Evolution Equations for Deterministic and Stochastic Systems (invited), TMR Workshop, Roscoff, May 19-23, 2003, France.
- *Noncooperative optimization of controls for time periodic Navier-Stokes systems with multiple solutions,* 1st AIAA Flow Control Conference, June 24-26, 2002, St. Louis, MO.
- *Optimal control of some periodic systems with distributed parameter,* Workshop on Analysis and PDEs (invited), Iasi University, January 2001, Romania.
- *Parameter identification for nonlinear time–periodic wave equation,* 5th French-Romanian Colloquium on Applied Mathematics (invited), August 2000, Constanta, Romania.
- *Time–periodic optimal control for the Euler–Bernoulli equation,* Annual Meeting of the Iasi Division of Romanian Academy (invited), October 2000, Romania.
- *Time periodic optimal control for the Boussinesq equation,* Conference on Fixed Point Theory and Applications (invited), "Babes Bolyai" Cluj-Napoca University, November 1999, Romania.
- *Optimal control of time periodic wave equations,* Annual Meeting of the Iasi Division of Romanian Academy (invited), October 1999, Romania.

Professional Membership

- *Society for Industrial and Applied Mathematics*
- *American Mathematical Society*

Advisor to Graduate Students

- Wenlong Pei (co-advisor William Layton), fourth year graduate student.
- Ahmet Güzel, **Ph.D.** (2018) University of Pittsburgh, with the thesis "*Higher Order Time Filters for Evolution Equations*". Assistant professor, Batman University, Turkey.
- Yong Li, (Primary advisor, co-advisor William Layton), **Ph.D.** (2016) University of Pittsburgh, with the thesis "*Time filters for numerical weather prediction*". Vice President at Goldman Sachs.
- Roxana Tanase, (co-advised with Ivan Yotov), Ph.D. (2016), University of Pittsburgh with the thesis "*Parameter estimation for partial differential equations using stochastic methods*".
- Hoang Tran, (Primary advisor, co-advisor William Layton), **Ph.D.** (2013) University of Pittsburgh, with the thesis "*Partitioned methods for coupled fluid flow problems*". Computer Science and Mathematics Division, at the Oak Ridge National Laboratory.
- Mark Tronzo, (co-advised with Ivan Yotov), 2010-2014, Ph.D., University of Pittsburgh, with the thesis "*Analysis of a Partial Differential Equation Model for Necrotizing Enterocolitis*".
- Andrew Jorgenson, **M.Sc.**, April **2012**, University of Pittsburgh, with the thesis "*Unconditional Stability of a Crank-Nicolson/Adams-Bashforth 2 Implicit/Explicit Method for Ordinary Differential Equations*".

I also helped mentor several of William Layton's students:

- Alexander Labovsky, 2006-2007, Ph.D., University of Pittsburgh, (now at Michigan Tech),
- Iuliana Stanculescu, 2007-2008, Ph.D., University of Pittsburgh, (now at Nova Southeastern University in FL),
- Jeffrey Connors, 2010, Ph.D., University of Pittsburgh, (now at University of Connecticut),
- Ross Ingram, 2011, Ph.D., University of Pittsburgh, (now at Bettis Atomic Power Laboratory of Bechtel Marine Propulsion Corporation),
- Xin Xiong, 2013, Ph.D., (now Data Scientist at Amazon),
- Aziz Takhirov, 2013, Ph.D., University of Pittsburgh, (now at University of Alberta),
- Nan Jiang, 2014, Ph.D., University of Pittsburgh, (now at Missouri University of Science and Technology),
- Michaela Kubacki, 2014, Ph.D., University of Pittsburgh, (now at Middlebury College),
- Marina Moraiti, 2014, Ph.D., University of Pittsburgh, (now at Bellevue College),
- Nick Hurl, 2017, Ph.D., University of Pittsburgh, (now at Slippery Rock State University),
- Haiyun Zhao, 2019, Ph.D., University of Pittsburgh (now at Morgan Stanley),
- Victor DeCaria, 2019, Ph.D., University of Pittsburgh (now postdoc at Oak Ridge National Laboratory).

Teaching Experience
Undergraduate Courses taught

- Lecturer for *Analytic geometry & Calculus I* (MATH 0220) University of Pittsburgh, Fall 2014
- Lecturer for *Numerical Mathematical Analysis* (MATH 1070) University of Pittsburgh, Fall 2019, Fall 2017, Fall 2016, Fall 2015, Fall 2014, Fall 2013, Fall 2010, Fall 2009, Fall 2008
- Lecturer for *Numerical Linear Algebra* (MATH 1080), University of Pittsburgh, Spring 2016, Spring 2009, Spring 2007

- Lecturer for *Differential Equations* (MATH 0290), University of Pittsburgh, Fall 2018, Fall 2017, Fall 2013, Fall 2011, Fall 2010, Fall 2007, Spring 2007

◦ Lecturer for *Differential Equations* (MAP 2302), Florida State University, Fall 2004

◦ Teaching Assistant for *Calculus, Differential Equations, Partial Differential Equations*, Iasi University, 1996-2000

Graduate Courses taught

- Lecturer for *Advanced Scientific Computing I. Optimal Control Theory of Partial Differential Equations* (MATH 2601) University of Pittsburgh, Fall 2019
- Lecturer for *Iterative Methods for Linear and Nonlinear Systems* (MATH 2030) University of Pittsburgh, Spring 2018
- Lecturer for *Focused Study: Optimal Control Theory of Partial Differential Equations. Theory, Methods and Applications* (MATH 3902) University of Pittsburgh, Spring 2017
- Lecturer for *Advanced Scientific Computing V. Numerical Solution of Partial Differential Equations* (MATH 3071) University of Pittsburgh, Fall 2015
- Lecturer for *Advanced Scientific Computing IV. Numerical Solution of Stochastic Differential Equations* (MATH 2604) University of Pittsburgh, Spring 2017, Spring 2015
- Lecturer for *Advanced Scientific Computing IV. Numerical Methods for Evolution Equations* (MATH 2604), University of Pittsburgh, Spring 2013
- Lecturer for *Advanced Scientific Computing III. An introduction to optimal control, parameter estimation and uncertainty quantification* (MATH 2603), University of Pittsburgh, Fall 2012
- Lecturer for *Finite Element Method* (MATH 3072), University of Pittsburgh, Spring 2011
- Lecturer for *Numerical Methods in Scientific Computing III. Optimal Control Theory* (MATH 2603) University of Pittsburgh, Fall 2008
- Lecturer for *Numerical Methods in Scientific Computing II* (MATH 2071), University of Pittsburgh, Spring 2019, Spring 2012, Spring 2010, Spring 2008
- Lecturer for *Numerical Methods in Scientific Computing I* (MATH 2070), University of Pittsburgh, Fall 2018, Fall 2011, Fall 2009, Fall 2007

◦ Directed study with Haomin Lin, on Optimal Control Theory at School of Computational Science, Florida State University, 2006.

New Courses developed

- *Advanced Scientific Computing. Numerical Solution of Stochastic Differential Equations*, University of Pittsburgh, Spring 2017, Spring 2015
- *Advanced Scientific Computing. Optimal Control of deterministic/stochastic PDEs and uncertainty quantification.* University of Pittsburgh, Fall 2019, Fall 2012, Fall 2008

Faculty Service

- Member of *Nominating Committee for the Dietrich School of Arts & Sciences*, University of Pittsburgh, 2014
- Colloquium Chair for 2008-2010, University of Pittsburgh
- Organizer of the Computational Mathematics Seminar, University of Pittsburgh, Spring 2007- Spring 2011, Spring 2015, Fall 2018-
- Member of the Hiring Search Committee in Scientific Computing 2008-2010, University of Pittsburgh
- Member of the Graduate Committee, University of Pittsburgh, 2009-2020
- Computer Committee member, University of Pittsburgh, 2008-2012 (chair 2012-2020)
- Member of the Executive Committee, University of Pittsburgh, 2016-2019

Service on Graduate Student Committees

- Ph.D. overview examination & Ph.D. thesis defense
  - Tongtong Li, overview defense, University of Pittsburgh, May 2020
  - Manu Jayadharan, overview defense, University of Pittsburgh, May 2020
  - Michael McLaughlin, PhD thesis defense, University of Pittsburgh, March 2020
  - Ahmed Zytoon, overview defense, University of Pittsburgh, 2019
  - Victor DeCaria, Ph.D. thesis defense, University of Pittsburgh, 2019
  - Haiyun Zhao, Ph.D. thesis defense, University of Pittsburgh, 2019
  - Joseph Fiordilino, Ph.D. thesis defense, University of Pittsburgh, June 2018
  - Ali Pakzad, Ph.D. thesis defense, University of Pittsburgh, 2018
  - Ahmet Güzel, Ph.D. thesis defense, University of Pittsburgh, 2018
  - Duygu Sap, Ph.D. thesis defense, University of Pittsburgh, July 2017
  - Yong Li, Ph.D. thesis defense, University of Pittsburgh, 2016
  - Roxana Tanase, Ph.D. thesis defense, University of Pittsburgh, 2016
  - Nan Jiang, Ph.D. thesis defense, University of Pittsburgh, December 3, 2014
  - Marina Moraiti, Ph.D. thesis defense, University of Pittsburgh, December 2, 2014
  - Shelby Stanhope, Ph.D. thesis overview, University of Pittsburgh, November 21, 2014
  - Michaela Kubacki, Ph.D. thesis defense, University of Pittsburgh, May 2014
  - Aziz Takhirov, Ph.D. thesis defense, University of Pittsburgh, May 5, 2014
  - Mark Tronzo, Ph.D. thesis defense, University of Pittsburgh, March 14, 2014
  - Xin Xiong, Ph.D. thesis defense, University of Pittsburgh, December 11, 2013
  - Hoang Tran, Ph.D. thesis defense, University of Pittsburgh, April, 2013
  - Nathaniel Mays, Ph.D. thesis committee member, University of Pittsburgh, May 2011
  - Ross N. Ingram, Ph.D. thesis committee member, University of Pittsburgh, April 2011
  - Collin Otis, Ph.D. thesis committee member, University of Pittsburgh, School of Engineering, July 2010
  - Danail Vassilev, Ph.D. thesis committee member, University of Pittsburgh, July 2010
  - Jeffrey Connors, Ph.D. thesis committee member, University of Pittsburgh, April 2010
  - Alexander Lozovskiy, Ph.D. thesis committee member, University of Pittsburgh, April 2010
  - Benjamin Ganis, Ph.D. thesis committee member, University of Pittsburgh, April 2010

- Alexandr Labovschii, Ph.D. thesis committee member, University of Pittsburgh, May 2008
- Haomin Lin, Ph.D. thesis committee member, Florida State University, July 2008

◦ Ph.D. comprehensive exam

- Yujie Ding, comprehensive exam on Numerical Methods in Scientific Computing, University of Pittsburgh, March 2020
- Derek Orr, comprehensive exam on Advanced Scientific Computing, Numerical Methods for ODEs, University of Pittsburgh, Summer 2019
- Mathew Alan Cook, comprehensive exam on Advanced Scientific Computing, Numerical Methods for ODEs, University of Pittsburgh, December 2019
- Derek Orr, comprehensive exam on Advanced Scientific Computing, Numerical Methods for ODEs, University of Pittsburgh, April 2019
- Manu Jayadharan, comprehensive exam on Advanced Scientific Computing, Iterative methods, University of Pittsburgh, June 2018
- Tongtong Li, comprehensive exam on Advanced Scientific Computing, Iterative methods, University of Pittsburgh, June 2018
- Shelby Stanhope, comprehensive exam on Advanced Scientific Computing, Optimal Control, University of Pittsburgh, May 2014
- ChangQing Wang, comprehensive exam on FEM, University of Pittsburgh, July-August, 2013
- Nick Hurl, comprehensive exam on FEM, University of Pittsburgh, May 15, 2011
- Michaela Kubacki, comprehensive exam on FEM, University of Pittsburgh, May 15, 2011
- Marina Moraiti, comprehensive exam on FEM, University of Pittsburgh, May 15, 2011
- Aziz Takhirov, comprehensive exam on FEM, University of Pittsburgh, May 15, 2011
- Xin Xiong, comprehensive exam on FEM, University of Pittsburgh, May 15, 2011
- Jin Li, comprehensive exam on Scientific Computing, University of Pittsburgh, May 15, 2011
- Evan Jenkins, MA exam on Scientific Computing, University of Pittsburgh, May 15, 2011
- Ming Zhong, comprehensive exam on Scientific Computing, University of Pittsburgh, September 30, 2010
- Hoang Tran, comprehensive exam on Advanced Scientific Computing, University of Pittsburgh, April 20, 2010
- Bo Shi, comprehensive exam on Scientific Computing, University of Pittsburgh, August 26, 2008
- Nathaniel Mays, comprehensive exam on Scientific Computing, University of Pittsburgh
- Ross N. Ingram, comprehensive exam on Scientific Computing, University of Pittsburgh, August 29, 2008
- Mark Tronzo, comprehensive exam on Scientific Computing, University of Pittsburgh, September 2008

◦ MS advisor

- Andrew Jorgenson, **M.Sc.**, April **2012**, University of Pittsburgh, with the thesis " Unconditional Stability of a Crank-Nicolson/Adams-Bashforth 2 Implicit/Explicit Method for Ordinary Differential Equations".

◦ MS examination

- Mathew Alan Cook, MA, Fall 2019
- Eric Bentley MA, Spring 2015
- Cesar A. Simon MS Thesis committee, March 2014
- Corinne Brucato, MS Thesis committee, April 2013
- Evan Jenkins, April 2011
- Steven Skopinski, April 2011

- Michelle Baker, July 2010

Service on Ph.D. Preliminary Examination Committee

- member on the Linear Algebra Prelim Committee, 2008
- member on the Analysis Prelim Committee, 2010-2011, 2013.

Service to Community

- University of Pittsburgh's *Tenure Council* (Autumn 2015-2019)
- volunteer Grand Awards judge at the Intel International Science and Engineering Fair 2012 in Pittsburgh, Pennsylvania.