

Terry L. Herdman

9 September 2024

Interdisciplinary Center for Applied Mathematics
Wright House 0531
765 West Campus Drive
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Education:

B.S. 1967, Mathematics with Physics Minor, Fort Hays State University
M.A. 1970, Mathematics, University of Oklahoma
PhD. 1974, Mathematics, University of Oklahoma
Dissertation: *Existence and Continuation Properties of Solutions of a Nonlinear Volterra Integral Equation*

Leadership and Management Experience:

2005-2022 Associate Vice President for Research Computing

- Member of the senior staff of the Vice President for Research and Innovation
- Member of the senior staff of the Vice President for Information Technology and Chief Information Officer

2009-2017, Member Board of Directors, Oak Ridge Associated Universities

- 2011-2012 Vice Chair, Board of Directors
- 2013-2014 Chair, Board of Directors

2011-2016, Member Executive Board, Energy Efficient Buildings, DOE Hub
2011-2021, Member, Board UT Battelle, LLC, Management and Contractor for Oak Ridge National Laboratory
1996– 2001 and 2008 Virginia Tech Commission on Research

- Chair, 1997-1998

2006-2021, Council Member, Oak Ridge Associated Universities
2006- 2022 Member Board of Trustees, Southeastern Universities Research Association

- Member, Information Technology Committee 2006-20014
- Member Finance Committee 2014-2022

2006-2022, Virginia Tech Representative to the Coalition for Academic Scientific Computation
2006-2022 Virginia Tech Liaison for Oak Ridge National Laboratory
1999-2021, Board Member, Mu Alpha Theta
1997-2002, Vice President for Education, Society for Industrial and Applied Mathematics

1988-2011, Member, SIAM Education Committee

- Applied/Industrial Mathematics Curriculum Recommendations
- University Chapters
- NCTM Association Review Group, Chair for SIAM Group
- Visiting Lectures Program
- CS&E programs and guidelines
- SIAM representative to The Conference Board on Mathematical Sciences, Educational Partnership

2016-2019, President Baltimore Washington Section of SIAM

1995-2004, Member Student Chapters Committee, Mathematics Association of America

- MAA Committee on Undergraduate Programs in Mathematics (CUPM) - SIAM Representative

2004-2006, International Organizing Committee, Mathematical Problems in Engineering and Aerospace Sciences, June 2006, Budapest, Hungary

2003-2004, Global Organizing Committee, Nonlinear Problem in Aviation and Aerospace, International Conference, 2004

2002-2004, Global Organizing Committee 2004 World Congress of Nonlinear Analysis, Orlando, Florida, July 2004

2001-2003, Member, Technical Advisory Council, Aurora Biometrics

2001-2003, Member, Battelle Technical Advisory Council, Leaders Group for Computational Sciences and Engineering Technical Network (for DOE laboratories ORNL, PNNL, NREL, Brookhaven)

1998-2000, Global Organizing Committee for the Third World Congress of Nonlinear Analysts

1995-1997, International Organizing Committee for Nonlinear Problems in Aviation and Aerospace, Daytona Beach, Florida

1995-1996, Global Organizing Committee for the 2nd World Congress of Nonlinear Analysts

1991-1992, Global Scientific Advisory Committee for the 1992 World Congress of Nonlinear Analysts

Research and Academia Experience:

2005-2022 Associate Vice President for Research Computing, Virginia Polytechnic Institute and State University

2002-2005 Director for Research Computing, Virginia Polytechnic Institute and State University

1988-2022, Professor Mathematics, Virginia Polytechnic Institute and State University

1987-2022 Director, Interdisciplinary Center for Applied Mathematics, Virginia Polytechnic Institute and State University

1996-2004, Director, Northern Virginia Program in Interdisciplinary Applied Mathematics, Virginia Polytechnic Institute and State University

2003-2005, Consultant, Solers Inc, Arlington Virginia
2002-2003, Consultant, Booz Allen and Hamilton, McLean Virginia
1980-1988, Associate Professor of Mathematics, Virginia Polytechnic Institute and State University
1975-1980 Assistant Professor of Mathematics, Virginia Polytechnic Institute and State University
1974-1975, Visiting Assistant Professor of Mathematics, Virginia Polytechnic Institute and State University
1972-1974, Special Instructor, Department of Mathematics, University of Oklahoma
1967-1972, Teaching and Research Assistant, Department of Mathematics, University of Oklahoma

Research Interests:

Modeling, analysis, design, approximation, and visualization of problems of interest to business, industrial, and government organizations

Honors:

Teaching Excellence Award, College of Arts and Sciences, Virginia Polytechnic Institute and State University, 1977, 1979, 1981.

United States Air Force Office of Scientific Research/Southeastern Center for Electrical Engineering Education-Research Fellow, 1983.

Member of the NASA LaRC Large Space Systems Team that was awarded a Langley Center Team Award, for contributions in the development and testing of inflation deployed, rigidizable space structure and materials, May 2008.

Sponsored Research:

1972-1974, Research Assistant, (W.T. Reid, PI), National Science Foundation and Air Force Office of Scientific Research grants.

1980, Associate Investigator, (J.A. Burns and E.M. Cliff, PIs), Parameter Identification for an Aeroelastic System, Air Force Office of Scientific Research, Grant AFOSR-80-0068, (\$51,900).

1982, Principal Investigator, An Application of Volterra Series to Large Amplitude Maneuvers, Flight Dynamics Laboratory, Air Force Wright Aeronautical Laboratories, Contract F33615-79-C-3030, (\$5,000).

1983, Principal Investigator, A Two-Dimensional Aeroelastic System, Flight Dynamics Laboratory, Air Force Wright Aeronautical Laboratories, Contract USAF/SCEEE F49620-82-C-0035, (\$5,000).

1983-1984, Principal Investigator, Neutral Functional Differential Equations and Unsteady Aerodynamics, Flight Dynamics Laboratory, Air Force Wright Aeronautical Laboratories, Contract USAF/SCEEE F49620-82-0035, (\$11,995).

1984-1987, Co-Principal Investigator (with C.A. Beattie and E.M. Cliff), Well Posedness and Spectral Estimation for Infinite Dimensional Systems, Air Force Office of Scientific Research, Grant AFOSR-84-0326, (\$125,539).

1986-1987, Co-Principal Investigator (with H. Stalford), Volterra Series and Nonlinear Control, Flight Dynamics Laboratory, Air Force Wright Aeronautical Laboratories, Contract USAF/ASD F33615-86-3617, (\$62,076).

1987-1991, Co-Principal Investigator (with J.A. Burns and E.M. Cliff), An Integrated Research Program for the Modeling Analysis and Control of Aerospace Systems, Defense Advanced Research Projects Agency, Grant DARPA/AFOSR F49620-87-C-0116, (\$1,369,560).

1988-1990, Principal Investigator, State Space Models for Aeroelastic and Visoelastic System, Air Force Office of Scientific Research, Grant AFOSR-88-0074, (\$41,102).

1989-1991, Co-Principal Investigator, (with J.A. Burns), Identification and Control of Systems with Memory, National Science Foundation, Grant INT-8815136, (\$14,027).

1993-1997, Center for Optimal Design and Control of Distributed Parameter Systems, Senior Investigator (J. Burns, Principal Investigator), Air Force Office of Scientific Research, Grant F49620-93-1-0280.

1994-1997, Research in Optimal Sensor/Actuator Location and Flutter Suppression - An Enhancement of Support for AFOSR Grant F49620-93-1-028, (with J. Burns), Air Force Office of Scientific Research, Grant F49620-93-1-0280-P00003.

1997-1998, Pre-processing and Post-processing for Large Scale Scientific Computations in Optimal Design and Control, (with E.M. Cliff and J. Burns), AFOSR Grant F49620-97-1-0304, (\$191,589).

1996-2000, Sensitivity and Adjoint Methods for design of Aerospace Systems, Senior Investigator (J. Burns, Principal Investigator), PERT Center Grant, Air Force Office of Scientific Research, Grant F49620-96-1-0329 (\$2,529,989).

1998-2002, Design and Diagnostic Tool for Manufacturing of Advanced Nanoscale Layered Materials, Senior Investigator (with J. Burns, PI for VPI&SU), DARPA Grant N00014-98-C-0318 (\$465,000).

2001-2002, Analysis of Data, (J. Burns, E.M. Cliff, and T.L. Herdman), FBI AIN103372, (\$75,000).

2002-2003, Further Studies of Data Classification, (J. Burns, E. M. Cliff and T. L. Herdman), Harris Corporation, AGMT 393891 (\$70,000).

2004-2007, Mathematical and Computational Tools for Analysis, Design and Optimization of Very Large Membrane Structures with Advanced Material Models, (with J. A. Burns, E. M. Cliff, and D. Inman), DARPA SPO and NASA LaRC, (\$2,300,000).

2004-2005, CSE Initiative, Coordinator and PI, Commonwealth of Virginia Governor's Research Panel, (\$250,000).

2007-2008, Investigation and Implementation of Sparse Grids, (with J. Burkardt), Sandia National Laboratories, (\$87,000).

2009-2010, Data Fusion and Analysis Center: Systems Modeling and Mathematics, (with J. Wingo) Department of Homeland Security, (\$222,504).

2008-2010, Investigation and Implementation of Sparse Grids, (with J. Burkardt), Sandia National Laboratories, (\$87,000).

2009-2011, Senior Investigator, Computer Design Tools for Building Models, Simulations and Sensitivity Analysis, PIs: John Burns, Lizette Zietsman and Eugene Cliff, (\$375,018).

2010-2011, Test and Analysis of Border Interdiction Technology, (with J. Wingo), Department of Homeland Security, (\$187,260).

2010-2015, PI, Energy Efficient Building Systems Regional Innovation Cluster Initiative, DOE Hub proposal with Penn. State, UTRC, IBM and others, (with John Burns VT lead PI and others), (Virginia Tech's share of the budget \$4,999,999).

2010-2013, PI, DHS IPA, J. Wingo, Department of Homeland Security, (\$1,067,518).

2012-2022 Virginia Tech PI, with Sotera Defense Solutions (Lead contractor), (CIO-SP3 Government-wide Acquisition Contract (GWAC), 10-year IDIQ, National Institutes of Health (NIH), award ceiling \$20M.

2016 Using Predictive Analysis as a Tool to Circumvent Operational HPC System Failures, Engility Corporation, Principal Investigators: Marshall, Michael B; Akers, Joshua; Settlege Robert E; Agarwala , Vijay K; Herdman, Terry

2016 -2018 CC*DNI Networking Infrastructure: A Campus Research Network and Distributed Science DMZ, National Science Foundation, National Science Foundation, \$498,519, Principal Investigators: Dougherty, William C; Herdman, Terry L.; Midkiff, Scott F.; Polys, Nicholas F; Barrett, Christopher L.; Dingus Thomas, A,

2005- 2022, Research Collaboration and Program Development, Terry L. Herdman Principle Investigator, ORNL UT Battelle LLC, \$583,056

2016-2021 Naval Research Laboratory Information Technology Directorate, IDIQ NRL Contact N00173-14-R-RV01, Sotera Defense Solutions, Inc. Lead, T. L. Herdman Virginia Tech PI, (1 Year Base + 4 (1) Year Options)

Note: This award included several researchers from ARC, ICAM, ECE, the Hume Center and Wireless @ Virginia Tech

Research Publications:

Books and Lecture Notes:

Lecture Notes on Differential and Integral Equations, (with J.A. Burns), U.S. Naval Research Laboratory, Washington, DC, 1977, (263 pages).

Sturmian Theory for Ordinary Differential Equations, by W.T. Reid, (edited and prepared for publication with J.A. Burns and C. Ahlbrandt), Applied Mathematical Sciences, Vol. 31, Springer-Verlag, New York, 1980, (599 pages).

Integral and Functional Differential Equations, Lecture Notes in Pure and Applied Mathematics, Vol. 67, T.L. Herdman, S.M. Rankin, and H.W. Stech, Eds., Marcel Dekker, New York, 1981, (276 pages).

Volterra and Functional Differential Equations, Lecture Notes in Pure and Applied Mathematics, Vol. 81, K.B. Hannsgen, T.L. Herdman, H.W. Stech, and R.L. Wheeler, Eds., Marcel Dekker, New York, 1982, (333 pages).

Research Papers:

1. Adjoint Semigroup Theory for a Volterra Integro-Differential System, (with J.A. Burns), Bull. Amer. Math. Soc., Vol. 81, No. 6, November 1975, pp. 1099-1102.
2. Adjoint Semigroup Theory for a Class of Functional Differential Equations, (with J.A. Burns), SIAM J. on Mathematical Analysis, Vol. 7, No. 5, October 1976, pp. 729-745.
3. Existence and Continuation Properties of Solutions of a Nonlinear Volterra Integral Equation, Dynamical Systems, Vol. 2, L. Cesari, J.K. Hale, and J.P. LaSalle, Eds., Academic Press, New York, 1976, pp. 307-310.
4. Behavior of Maximally Defined Solution of a Nonlinear Volterra Equation, Proc. American Math. Soc., Vol. 67, No. 2, December, 1977, pp. 297-302.
5. Functional Differential Equations with Discontinuous Right-Hand Side, (with J.A. Burns), Volterra Equations, Lecture Notes in Mathematics #737, S.O. Londen and O.J. Staffans, Eds., Springer-Verlag, New York, 1979, pp. 99-106.
6. A Note on Noncontinuable Solutions of a Delay Differential Equation, Differential Equations, S. Ahmad, M. Keener, and A.C. Lazer, Eds., Academic Press, New York, 1980, pp. 187-192.
7. The Cauchy Problem for Linear Functional Differential Equations, (with J.A. Burns and H.W. Stech), Integral and Functional Differential Equations, Lecture Notes in Pure and Applied Mathematics, Vol. 67, T.L. Herdman, S.M. Rankin III, and H.W. Stech, Eds., Marcel Dekker, New York, 1981, pp. 139-149.
8. An Application of Volterra Series to Large Amplitude Maneuvers, AFWAL-TM-83-173-FIGC, 1983, 55 pages.
9. Linear Functional Differential Equations as Semigroups on Product Spaces, (with J.A. Burns and H.W. Stech), SIAM J. Math. Anal., Vol. 14, No. 1, 1983, pp. 98-116.

10. A State Space Model for an Aeroelastic System, (with J.A. Burns and E.M. Cliff), Proc. 22nd IEEE Conference on Decision and Control, 1983, pp. 1074-1077.
11. Differential-Boundary Operators and Associated Neutral Functional Differential Equations, (with J.A. Burns and H.W. Stech), Rocky Mountain J. Math., Vol. 13, No.1, Winter 1983, pp. 125-142.
12. Well-Posedness of Functional Differential Equations with Nonatomic D Operators, (with J.A. Burns and J. Turi), Trends in Theory and Practice of Nonlinear Analysis, North Holland Mathematics Studies, Vol. 110, V. Lakshmikantham, Ed., Elsevier Science, Inc. Publishing Company, New York, 1985, pp. 71-78.
13. Nonatomic Neutral Functional Differential Equations, (with J.A. Burns and J. Turi), Nonlinear Analysis and Applications, Lecture Notes in Pure and Applied Mathematics, Vol. 109, V. Lakshmikantham, Ed., Marcel Dekker, Inc., New York, 1987, pp. 635-646.
14. On Integral Transforms Appearing in the Derivation of the Equations of an Aeroelastic System, (with J.A. Burns, E.M. Cliff, and J. Turi), Nonlinear Analysis and Applications, Lecture Notes in Pure and Applied Mathematics, Vol. 109, V. Lakshmikantham, Ed., Marcel Dekker, Inc., New York, 1987, pp. 89-98.
15. Accurate Modeling of Nonlinear Systems Using Volterra Series Submodels, (with H.L. Stalford, W.T. Baumann, and F.E. Garrett), 1987 American Control Conference, Minneapolis, MN, June 10-12, 1987, pp. 886-891.
16. Recent Work Using Volterra Series as a Methodology to Analyze Nonlinear Aircraft Dynamics Properties, (with W.T. Baumann, H.L. Stalford, and C. Suchomel), Math. Compt. Modelling, Vol. II, 1988, pp. 882-888.
17. A Volterra Series Submodel Approach to Modeling Nonlinear Aerodynamic Systems, (with W.T. Baumann, J.E. Garrett, and H.L. Stalford), AFWAL-TR-88-3040, 72 pages.
18. State Space Formulation for Functional Differential Equations of Neutral-Type, (with J.A. Burns and J. Turi), Nonlinear Semigroups, Partial Differential Equations and Attractors, T.L. Gill and W.W. Zachary, Eds., 1989 Lecture Notes in Mathematics, Vol. 1394, Springer-Verlag, pp. 1-10.
19. Neutral Functional Integro-Differential Equations with Weakly Singular Kernels, (with J.A. Burns and J. Turi), J.M.A.A., 145, January 1990, pp. 371-401.

20. On the Solution of a Class of Integral Equations Arising in Unsteady Aerodynamics, (with J. Turi), *Differential Equations: Stability and Control, Lecture Notes in Pure and Applied Mathematics*, Vol. 127, S. Elaydi, Ed., Marcel Dekker, 1990, pp. 241-248.
21. An Application of Finite Hilbert Transforms in the Derivation of a State Space Model for an Aeroelastic System, (with J. Turi), *Journal of Integral Equations and Applications*, Vol. 3, No. 2, Spring 1991, pp. 271-287.
22. Singular Neutral Equations, (with J. Turi), *New Trends and Applications of Distributed Parameter Control Systems, Lecture Notes in Pure and Applied Mathematics*, Volume 128, G. Chen, E.B. Lee, W. Littman and L. Markus, Eds., Marcel Dekker, 1991, pp. 501-511.
23. Finite Memory Approximations for a Singular Neutral System Arising in Aeroelasticity, (with E.M. Cliff and J. Turi), *Proc. 30th IEEE Conference on Decision and Control*, 1991, pp. 3014-3019.
24. A Parameter Dependence Problem in Neutral Functional Differential Equations, (with D. Brewer), *Partial Differential Equations, Pitman Research Notes in Mathematics Series*, Vol. 273, J. Hale and J. Wiener, Eds., 1992, pp. 74-79.
25. The Computation of the Adjoint Generator for a Singular Neutral Equation, (with E. Fernandez and J. Turi), *Applied Mathematics Letters*, Vol. 5, no. 6, 1992, pp. 19-23.
26. Theory and Applications of Nonatomic Neutral Functional Differential Equations, (with J. Turi), *Selected Invited Lectures--Third International Colloquium on Differential Equations*, Plovdiv, Bulgaria, 1992, pp. 86-99.
27. On Control Design for a Fluid-Structure Interaction Problem, (with J. Borggaard and J. Turi), *IEEE Aerospace Control Systems-Proceedings*, 1993, pp. 236-242.
28. Collection Techniques for the Approximation of Singular Neutral Functions, (with G. Cerezo, E. Berdaguer and J. Turi), *Proc. 33rd IEEE Conference on Decision and Control*, 1994, pp. 2534-2536.
29. On an Application of the Boundary Element Method to Study Flow Induced Vibrations, (with J. Borggaard and J. Turi), *Applied Mechanics in the Americas*, Vol. II, Dynamics and Vibrations/Optimization and Control, 1995, pp. 317-321.
30. A "Natural" State-Space for an Aeroelastic Control System, (with J. Turi), *Journal of Integral Equations and Applications*, Vol. 7, No. 4, Fall 1995, pp. 413-423.

31. Parameter Identification Techniques for Singular Neutral Equations, (with G. Cerezo, E. Berdaguer and J. Turi), Applied Mechanics in the Americas, Vol. II, Dynamics and Vibrations/Optimization and Control, 1995, pp. 322-327.
32. Identification of Parameters in Hereditary Systems: A Numerical Study, (with F. Hartung and J. Turi), Proc. of the 3rd IEEE Mediterranean Symposium on New Directions in Control and Automation, Vol. 1, 1995, pp. 291-298.
33. Identification of Parameters in Hereditary Systems, (with F. Hartung and J. Turi), Proc. of ASME Fifteenth Biennial Conference on Mechanical Vibration and Noise, DE-Vol. 84-3, 1995, pp. 1061-1066.
34. An Optimization Based Approach to Flow Matching for Burger's Equation with a Forcing Term, (with K. Kang), Proc. of ASME Fifteenth Biennial Conference on Mechanical Vibration and Noise, DE-Vol. 84-3, 1995, pp. 1083-1086.
35. On Active Control of Flow Induced Vibrations, (with J. Borggaard and J. Turi), Proc. of 34th IEEE Conference on Decision and Control, 1995, pp. 3725-3729.
36. Minimum Loss Optimization in Distribution Systems: Discrete Ascend Optimal Programming, (with R. Broadwater, P. Dolloff, R. Karamikhova, and A. Sargent), Electric Powers Systems, Vol. 36, 1996, pp. 113-121.
37. Applications of Neutral Functional Differential Equations, (with J. Turi), Primer Coloquio Latinoamericano de Matematica Aplicada A la Industry Y la Medicina, Vol. 1, Editors, C. D'Attellis and E. Berdaguer, 1996, pp. 81-95.
38. A Structured Reduced Sequential Quadratic Programming and its Application to a Flow Matching Problem, (with K. Kang), Proceedings of the International Conference on Nonlinear Problems in Aviation and Aerospace, Daytona Beach, Florida, Editor S. Sivasundaram, 1996, pp. 255-262.
39. On the Existence, Uniqueness and Numerical Approximations for Neutral Equations with State Dependent Delays, (with F. Hartung and J. Turi), Journal of Applied Numerical Mathematics, 24, 1997, pp. 393-409.
40. Numerical Methods for Singular Integro-differential Equations of Neutral Type, (with S. Chiang and J. Turi), Proc. 15th IMACS World Congress on Scientific Computation Modeling and Applied Mathematics, Vol. 2, Wissenschaft and Technik, Verlag, Berlin, Editor, A. Sydow, 1997, pp. 465-468.
41. Parameter Identification in Classes of Hereditary Systems of Neutral Type, (with F. Hartung and J. Turi), Journal of Applied Mathematics and Computation, Vol. 89, 1998, pp. 147-160.

42. A Structured Reduced Sequential Quadratic Programming and its Application to a Shape Design Problem, (with K. Kang), *Journal of Computational Optimization and Applications*, Vol. 11, 1998, pp. 81-100.
43. Convergent Spectral Approximations for the Thermomechanical Processes in Shape Memory Alloys, (with P. Morin and R. Spies), *Journal of Nonlinear Analysis*, Vol. 39, No. 1, 2000, pp. 11-32.
44. On Differentiability of Solutions with respect to Parameters in State-Dependent Delay Equations, (with F. Hartung and J. Turi), *Journal of Nonlinear Analysis*, Vol. 39, No. 3, 2000, pp. 305-325.
45. Modal Approximations for the Dynamics of Shape Memory Alloys under External Thermomechanical Actions, (with P. Morin and R. Spies), *Proc. 3rd International Conference on Nonlinear Problems in Aviation and Aerospace*, Editor, S. Sivasundaram, Vol. 1, 2001, pp. 303-316.
46. Numerical Identification Techniques for Singular Neutral Functional Differential Equations, (with G. Cerezo, E. Fernandez and J. Turi), *Proc. 3rd International Conference on Nonlinear Problems in Aviation and Aerospace*, Editor, S. Sivasundaram, Vol. 1, 2001, pp. 163-167.
47. Parameter Identification for Nonlinear Abstract Cauchy Problems with Quasilinearization, (with P. Morin and R. Spies), *Journal of Optimization Theory and Applications*, May 2002, Vol. 113, No. 2, May 2002, pp. 227-250.
48. A Hybrid Collocation Method for Volterra Integral Equations with Weakly Singular Kernels, (with Y. Cao and Y. Xu), *SIAM Journal of Numerical Analysis*, Vol. 41, No. 1, 2003, pp. 364-381.
49. Frechet Differentiability of the Solutions of a Semilinear Abstract Cauchy Problem, (with Ruben Spies), *JMAA*, Volume/Issue 307/2, 2005, pp. 656-676.
50. Approximations for a Class of Volterra Integro-Differential Equations, (with E.M. Cliff and H. Nguyen), *Mathematical and Computer Modeling*, 42, 2005, pp. 659-672.
51. Numerical Approximations for a Class of Volterra Equations with Realizable Kernels, (with H.K. Nguyen), *Journal of Integral Equations and Applications*, Vol. 18, No. 3, Fall 2006, pp. 337-360.

52. Singularity Expansion for a Class of Neutral Equations, (with Y. Cao, G. Cerezo, and J. Turi), Journal of Integral Equations and Applications, Vol. 19, No. 1, Spring 2007, pp. 13-32.
53. Minimum Angular-Impulse Control for ISAT, (with E.M. Cliff and Z. Y. Liu), 47th AIAA/ASME/ASCE/AHS/ASC Structures, structural Dynamics and materials Conference and 14th AIAA/ASME/AHS Adaptive Structures Conference, AIAA, 2006, Paper No. 1979 (Note: this was extended to the paper below).
54. Minimum Angular-Impulse Control for a Large Flexible Spacecraft, (with E.M. Cliff and Z. Y. Liu), Journal of Guidance and Control and Dynamics, Vol. 30, No. 1, Jan.-Feb. 2007, pp. 87-99.
55. Results on Transversal and Axial Motions of a System of Two Beams Coupled to a Joint through Two Legs, (with J.A. Burns, E.M. Cliff, Z.Y. Liu and R.D. Spies), ICNPAA 2006, Cambridge Scientific Publishers, Mathematical Problems in Engineering and Aerospace Sciences, Cambridge Scientific Publishers, pp. 85-98.
56. On the Numerical Solutions of Singular Integro-Differential Equations, (with Shihchung Chiang), World Congress in Computer Science, Computer Engineering and Applied Computing, WORLD COMP'07, Regular Research Report, Las Vegas, June 2007.
57. Well-Posedness, Stability and Numerical Results for the Thermoelastic Behavior of a Coupled Joint-Beam System Modeling the Transverse Motions of the Antennas of a Space Structure, (with E. M. Cliff, Z. Liu and R. Spies), Proc. Appl. Mech. 7, 2007, pp. 1040309-1040310.
58. Well Posedness and Exponential Stability of a Thermoelastic Joint-Leg-Beam System with Robin Boundary Conditions", (with E. M. Cliff, B. I. Fulton, Z. Liu and R. Spies), Mathematical and Computer Modeling, Vol. 49, 2009, pp. 1097-1108.
59. Generalized Qualification and Qualification Levels for Spectral Regularization Methods, (with R. D. Spies, and K. G. Temperini), Journal of Optimization Theory and Applications, Vol. 141, 2009, pp. 547-567.
60. Global Saturation of Regularization Methods for Inverse Ill-Posed Problems, (with R.D. Spies and K.G. Temperini), Journal of Optimization Theory and Applications, Vol. 148, 2011, pp. 164-196.
61. Approximating Parabolic Boundary Control Problems with Delayed Actuator Dynamics, Invited paper, (with J. A. Burns L. and Zietsman), in Proceedings of the 2013 American Control Conference, Paper MoC14.4, pp. 2080-2085.

62. Infinite Dimensional Delay Differential Equations in Control and Sensitivity Analysis, Special issue: Approximation and Control for Distributed Parameter Systems with Applications, (with J. A. Burns L. and Zietsman), , Mathematics in Engineering, Science and Aerospace (MESA), 2013, Vol. 4, No. 2, p131-157.
63. Revised Numerical Methods for Optimal Control of a Class of Singular Integro-Differential Equations, (with Chiang, Shihchung), Mathematics in Engineering, Science and Aerospace (MESA), 2013, Vol. 4, No. 2, pp. 171-178.
64. Control of PDE Systems with Delays, (with J. A. Burns L. and Zietsman), IFAC Workshop on Control of Systems Modeled by Partial Differential Equations, Sept 2013, pp. 85-90.
65. Numerical Algorithms for Solving One Type of Singular Integro-Differential Equation Containing Derivatives of the Time Delay States, (With Chiang, Shihchung) , Applied Mathematics, 2015 , 6, 1294-1301, published on line July 2015 in SciRes.
66. Identification of Dynamical Systems with Structured Uncertainty, (with J. A. Burns and E. M. Cliff), Inverse Problems in Science and Engineering, Vol. 26, No. 1-4, Special Issue, January - April 2018, pp. 280-321.
67. Numerical Algorithms for Solving Optimal Control Problems with Integro-Differential Equations of the Second Kind as Constraints, (with Shihchung Chiang) 2017 13th IEEE International Conference on Control & Automation (ICCA) July 3-6, 2017. Ohrid, Macedonia pp.198-202.
68. Parameter Estimation of a Thermal Fluid System, (with J. A. Burns and E. M. Cliff), 2018 ACC, Milwaukee Wisc., pp. 122-127.
69. Identification of Dynamical Systems with Structured Uncertainty, (with J. A. Burns, E. M. Cliff and T. L. Herdman, Journal of Inverse Problems in Science and Engineering, Vol 26, 280-321.
70. On Well-posedness and Approximation of Composite Systems, (with J. A. Burns, E. M. Cliff and T. L. Herdman), Proceedings of the 23rd MTNS Conference (2018), Kong Kong, pp.51-56.
71. Optimal Sensor Placement for Observer Design, (with J. A. Burns), 24th International Symposium on Mathematical Theory of Networks and Systems, , Paper ID: 353, Invited Session Full Paper, Cambridge, UK , August 23-27, 2021.
72. On the Infinite Field of a Class of Weakly Singular Integral Equations, With S.

Graduate Theses Directed:

J. Turi, "Well Posedness Questions and Approximation Schemes for a General Class of Functional Differential Equations," Ph.D. Thesis, Virginia Polytechnic Institute and State University, June 1986.

S. Garrett, "A Mathematical Model for the Detection of Deep Space Objects," M.S. Thesis, Virginia Polytechnic Institute and State University, May 1987.

P. Hammer, "Parameter Identification in Parabolic Partial Differential Equations using Quasilinearization," Ph.D. Thesis, Virginia Polytechnic Institute and State University, August 1990.

T. Burrell, "An Alternating Direction Search Algorithm for Low Dimensional Optimization: An Application to Power Flow," M.S. Thesis, Virginia Polytechnic Institute and State University, May 1992.

J. Moore, "Comparisons of Correlation Methods in Risk Analysis," M.S. Thesis, Virginia Polytechnic Institute and State University, (Joint with M. Gunzburger), May 1994.

G. Cerezo, "Approximation and Identification Problems for Neutral Functional Differential Equations," M.S. Thesis, Virginia Polytechnic Institute and State University, May 1994.

K. Kang, "A Structured Reduced Sequential Quadratic Programming and its Application to a Shape Design Problem," Ph.D. Thesis, Virginia Polytechnic Institute and State University, September 1994.

S. Chiang, "Numerical Solutions for a Class of Singular Integrodifferential Equations," Ph.D. Thesis, Virginia Polytechnic Institute and State University, April 1996.

G. Cerezo, "Solution Representations and Identification for Singular Neutral Functional Differential Equations," Ph.D. Thesis, Virginia Polytechnic Institute and State University, December 1996.

M. Borsuik, "Bifurcation Analysis of the Frog Egg Cell Cycle", Ph.D. Thesis, Virginia Polytechnic Institute and State University, (Joint with J. Tyson, Biology), May 1997.

- J. Albanus, "An Analysis of Stability Margins for Continuous Systems", M.S. Thesis, Virginia Polytechnic Institute and State University, (Joint with J. A. Burns), May 1999.
- D. Herdman, "Approximations for Singular Integral Equations", M.S. Thesis, Virginia Polytechnic Institute and State University, (Joint with J. A. Burns), May 1999.
- S. Burrowbridge, "Optimal Allocation of satellite Network Resources", M.S. Thesis, Virginia Polytechnic Institute and State University, (Joint with T. Hagar), Dec. 1999.
- K. Bellino, "Computational Algorithms for Face Alignment and Recognition", M.S. Thesis, Virginia Polytechnic Institute and State University, May 2002.
- H. Nguyen, On a Class of Volterra Systems with Realizable Kernels, Ph.D. Dissertation, Virginia Polytechnic Institute and State University, May 2004.
- M. Pierson, Theory and Applications of a Class of Abstract Differential-Algebraic Equations, Ph.D. Dissertation, Virginia Polytechnic Institute and State University, May 2005.
- B. Fulton, Analysis and Approximations of Viscoelastic and Thermoelastic Joint-Beam Systems, Ph.D. Dissertation, Virginia Polytechnic Institute and State University, August 2006.
- O. Bondarenko, Optimal Control for an Impedance Boundary Value Problem, M. S. Thesis, Virginia Polytechnic Institute and State University, (Joint with J. Borggaard and Andreas Kirsch), December 2010.

Invited Lectures/Participation:

- Conference on Optimal Control and Differential Equations, University of Oklahoma, Norman, OK, March 1977.
- Helsinki Symposium on Integral Equations, Institute of Mathematics, Helsinki University of Technology, Finland, August 1978.
- John Barrett Memorial Lectures (20 minutes lecture), University of Tennessee, Knoxville, TN, April 1979.
- Arkansas-Oklahoma Meeting of the A.M.S., Special Session on Control Theory and Applications, Norman, OK, March 1983.

Estimation and Control of Distributed Systems - Lecture Series in Mathematical Sciences, University of Arkansas, April 1984.

The VIth International Conference on Trends in the Theory and Practice of Nonlinear Analysis, University of Texas at Arlington, Arlington, TX, June 1984.

The VIIth International Conference on Nonlinear Analysis and Applications, University of Texas at Arlington, Arlington, TX, July 1986.

International Conference on Differential Equations; Theory and Applications in Stability and Control, Colorado Springs, CO, June 1989.

International Conference on Theory and Applications of Differential Equations, University of Texas-Pan American, Edinburg, Texas, May 1991.

Third International Colloquium on Differential Equations, Plovdiv, Bulgaria, August 1992.

Joint Mathematics Meetings, Special Session, Integro-Differential Equations: Stability and Control, San Antonio, Texas, January 1993.

Conference on Graduate Programs in the Applied Mathematical Sciences II, Curriculum Innovations, Clemson University, April 1993.

Pan American Conference on Applied Mechanics, Special Session on Fluid Structure Interactions, Buenos Aires, Argentina, January 1995.

Pan American Conference on Applied Mechanics, Special Session on Controls, Buenos Aires, Argentina, January 1995.

3rd IEEE Mediterranean Symposium on New Directions in Control and Automation, Special Session on Infinite Dimensional Systems, Limassol, Cyprus, July 1995.

International Conference on Dynamical Systems, Atlanta, Georgia, May 1995.

The American Society of Mechanical Engineers Conference on Mechanical Vibrations and Noise, Special Session on Parameter Identification (2 lectures), September 1995.

International Conference on Mathematics Applied to Industry and Medicine, Buenos Aires, Argentina, November 1995.

International Conference on the Numerical Solutions of Volterra and Delay Equations, Tempe, Arizona, May 27-30, 1996.

Second World Congress of Nonlinear Analysts, Athens Greece, July 10-17, 1996.

SIAM National Meeting, Special Session on Undergraduate Research Projects, July 1997.

The 15th IMACS World Congress on Scientific Computation, Modelling and Applied Mathematics, Special session on Numerical Solutions of Integral and Integro-differential Equations, Berlin Germany, August 1997.

Buckingham Lecturer, 25th Annual Mathematics and Statistics Conference - Math at Work, Miami University, Oxford, Ohio, September 1997.

SIAM Workshop on Mathematics in Industry, North Carolina State University, November 1999.

Institut für Praktische Mathematik, Universität Karlsruhe, series of 4 lectures on functional and singular integral equations, June 2000.

Third World Congress of Nonlinear Analysts, Special Session on Integro-differential and Volterra Equations: Numerical Techniques, Simulations and Applications, Catania, Sicily, Italy, July 2000.

Conference on Applied Mathematics, University of Central Oklahoma, Edmond, Oklahoma, February 2001

SIAM Annual Meeting, Special Session, Courses and Research in Controls and Applied Mathematics, San Diego, July 2001.

SIAM Annual Meeting, Special Session, Masters Programs in Industrial, Financial, Bio and Applied Mathematics, San Diego, California, July 2001.

Mu Alpha Theta National Convention, Denver, Colorado, August 2001.

Institut für Praktische Mathematik, Universität Karlsruhe, Neutral Equations Seminar, May 2002.

Fakultät für Mathematik, Mathematisches Kolloquium, Universität Karlsruhe, Computational Algorithms for Face Alignment and Recognition, May 2002.

Institut für Wissenschaftliches Rechnen und Mathematische Modellbildung, Universität Karlsruhe, Modeling of Airfoil Flutter, seminar, May 2002.

Mathematics Department, University of North Carolina at Greensboro, November 2002.

Fourth International Conference on Dynamical Systems, Morehouse College, Atlanta, Georgia, May 2003.

International Conference on Delay Differential and Difference Equations with Applications, Veszprém, Hungary, August 25-29, 2003.

II Congreso Internacional de Matematica Aplicada a la Ingenieria y Ensenanza de la Matematica, Buenos Aires, Argentina, December 2003.

ETSU SIAM SEAS Meeting Plenary Lecturer, ETSU, April 2004

DARPA Government TIM 3 May, Invited Lecture, Fort Worth Texas, May 2004.

Maryland Washington DC SIAM Meeting, Plenary Lecture, May 2004

DARPA/NASA Workshop on Large Space Systems I, (Invited paper with E. Cliff), Hampton, Virginia, August 2004

International Conference on Approximation Methods for Design and Control, Buenos Aires, Argentina, March 2005.

Special Session on Large Space Systems, SIAM Annual Meeting, New Orleans, LA, July 2005.

DARPA, Large Space Systems Workshop, (Invited paper with E. Cliff), Mandalay Beach, California, September 2007.

Control and Inverse Problems for Distributed Parameter Systems, Invited Session at IFIP 2005, Turin, Italy, July 2005.

DARPA/NASA Workshop on Large Space Systems II, (Invited paper with E. Cliff), Santa Fe, NM, August 2005

SIAM Conference on Computational Science and Engineering (Panel Member), Costa Mesa, California, February 2007.

DARPA, Large Space Systems Workshop (Invited paper with E. Cliff), Hampton, Virginia, August 2007.

Well-Posedness for a Thermoelastic Joint-Leg-Beam System, III International Conference: Approximation Methods for Design and Control, Buenos Aires, Argentina, 7-11 March 2009.

Mathematical Models for Non-Intrusive Inspection Systems, II Argentinean Conference on Applied, Computational and Industrial Mathematics (II MACI 2009), Rosario, Argentina, 14-16 December 2009.

Special Session: Approximation and Control for Distributed Parameter Systems with Applications, ICNPAA 2012, Vienna, Austria, July 2012.

Colloquia Presentations:

Virginia Polytechnic Institute and State University, January 1976.
Virginia Commonwealth University, February 1978.
Virginia State College, October 1978.
Randolph Macon College, October 1978.
University of Oklahoma, March 1979.
Emory and Henry College, January 1980.
Shepherds College, April 1980.
North Carolina State University, April 1983.
Air Force Flight Dynamics Laboratory, Control Dynamics Branch, May 1983.
West Virginia University, May 1983.
Air Force Institute of Technology, School of Engineering/Department of Mathematics, August 1983.
Air Force Wright Aeronautical Laboratories, Design Predictions Group, September 1983.
West Virginia University, April 1985.
Wake Forest University, October 1986.
University of Southern California, January 1987.
University of Arkansas, February 1987.
Worcester Polytechnic Institute, November 1988.
Bridgewater College, December 1988.
James Madison University, January 1989.
University of Southern California, Center for Applied Mathematical Sciences, February 1990.
Lockheed Corporation, Calabasas, CA, February 1990.
Instituto Argentino de Matematica (IAM), Conicet, Buenos Aires, Argentina, March 1990.
Instituto de Desarrollo Tecnológico Para la Industria Química (INTEC), Santa Fe, Argentina, March 1990.
University of Arkansas, October 1990.
University of Texas at Dallas, October 1990.
Instituto De Matematica E Estatistica, Universidade De Sao Paulo, Sao Paulo, Brazil, April 1991.
University of Oklahoma, September 1991.
University of Texas-Dallas, September 1991.
Florida Institute of Technology, October 1991.

Institut für Praktische Mathematik, Universität of Karlsruhe, Karlsruhe, Germany, July 1995.
Memorial University of Newfoundland, St. Johns, Newfoundland, July 1997.
University of Minnesota at Duluth, September 1997.
Virginia State University, October 1997.
Bridgewater College, January 1998.
Universität Karlsruhe, Germany, July 2000.
Trier University, Germany, July 2000.
University of Texas at Dallas, Seminar, Feb. 2002.
Universität Karlsruhe, Institut für Praktische Mathematik, May 2002.
Universität Karlsruhe, Fakultät für Mathematik, May 2002.
Universität Karlsruhe, Institut für Wissenschaftliches Rechnen und Mathematische Modellbildung, May 2002.
University of North Carolina at Greensboro, Mathematics Department, November, 2002.
James Madison University, Mathematics Department, January 2005.
University of Tennessee, Mathematics Department, October 2006.
Karlsruhe Institute of Technology, Karlsruhe Germany, July 2012.

Conferences Organized:

Volterra and Functional Differential Equations Conference (with K. Hannsgen and R. Wheeler), Virginia Polytechnic Institute and State University, June 1981, (National Science Foundation Grant MCS-80-23198).

Southeastern Regional Conference on Differential Equations (with K. Shaw et al.), Virginia Polytechnic Institute and State University, November 1981.

Spring Meeting of the Society for Industrial and Applied Mathematics (with J.A. Burns and E.M. Cliff), Denver, CO, June 1983, (funded by AFOSR, ARO, NSF, and DOE).

Mathematics Education in Transition, Minisymposium, Society for Industrial and Applied Mathematics Summer Meeting, Seattle, WA, July 1984.

Numerical Solutions of Partial Differential Equations, (with J.A. Burns et al.), Blacksburg, VA, September 1988.

Control and Approximation of Functional Differential Equations, Invited Session, 27th IEEE Conference on Decision and Control, (with E.M. Cliff), Austin, TX, December 1988.

Parameter Identification in Distributed Parameter Systems, Invited Session, 28th IEEE Conference on Decision and Control, (with E.M. Cliff), Tampa, FL, December 1989.

Computational Methods for Parameter Estimation and Control, Invited Session, First World Congress of Nonlinear Analysts, Tampa, FL, August 1992.

Second SIAM Forum on Industrial and Applied Mathematics, Undergraduate/Masters Curriculum in Applied Mathematics, (with M. Gunzburger), June 1993.

Modeling for Identification and Control, 34th CDC, Invited Session, New Orleans, Louisiana, December 1995.

Nonlinear Problems in Aviation & Aerospace, Special Session on Modeling and Analysis for Aerospace Systems, Dayton Beach, Florida, May 1996.

The Second World Congress of Nonlinear Analysts, Minisymposium on Modeling, Control and Estimation of Dynamical Systems, Athens, Greece, July 10-17, 1996.

SIAM Student Conference, Clemson, South Carolina, (with Robert Fennell), March 1996.

International Conference on Nonlinear Problems in Aviation and Aerospace, Special Session on Modeling and Analysis for Aerospace Systems, Daytona Beach, Florida, May 9-11, 1996.

SIAM Workshop on Mathematics in Industry, North Carolina State University, Raleigh, North Carolina, (with Robert Fennell and H. Tran), November 1999.

International Conference on Nonlinear Problems in Aviation and Aerospace, Special Session on Aerospace Applications of Optimization and Control, Daytona Beach (with J. Borggaard and E. M. Cliff), Florida, May 10-12, 2000.

Third World Congress of Nonlinear Analysts, Special Session on Integro-differential and Volterra Equations: Numerical Techniques, Simulations and Applications (with H. Brunner and J. Turi), Cantania, Sicily, Italy, July 2000.

Third World Congress of Nonlinear Analysts, Special Session on Optimal design and Control (with J. Borggaard and E. M. Cliff), Cantania, Sicily, Italy, July 2000.

HPC for CSE (With J. Buchanan, E. Cliff, and K. Shinpaugh), Blacksburg Virginia, May 2005.

Approximation and Control for Distributed Parameter Systems with Applications, with J. Turi, University of Texas at Dallas, Vienna, Austria, July 2012.

Professional Societies:

Society for Industrial and Applied Mathematics

Editorial Board:

Associate Editor, Journal of Integral Equations and Applications

National Panels - Mathematics Education:

Applied Mathematics Professional Master's Degree, SIAM National Meeting, July 1997

Mathematical Jobs Outlook for the 21st Century, Math at Work: Mathematics and Statistics Conference, Oxford Ohio, September 1997.

Future of the NCTM Standards, AMS/MAA Joint Winter Meeting, January 1998.

CUPM Curriculum Guide: Mathematics and Engineering.

- Revision of the CUPM Curriculum Guide: Mathematics and Engineering.

Refereeing and Reviewing:

Reviewer for: National Science Foundation, Mathematical Reviews, National Sciences and Engineering Research Council of Canada.

Referee for: Journal of Differential Equations, Journal of Mathematical Analysis and Applications, SIAM Journal on Control and Optimization, Canadian Mathematics Bulletin, IEEE Conference on Decision and Control, SIAM Review, Journal of Mathematical Biology, Quarterly of Applied Mathematics, Journal of Nonlinear Analysis, Journal of Integral Equations and Applications, Nonlinear Analysis: Theory, Methods, and Applications, Journal of Applied Numerical Mathematics, Journal of Vibration and Control, Journal of Applied Mechanics, Rocky Mountain Journal of Mathematics, Journal of Optimization Theory and Applications, Non Linear Dynamics, Mathematical Problems in Engineering.

Reviewer for proposed textbooks: Prindel, Weber and Schmidt; Scott Foresman and Company; Prentice Hall; Addison-Wesley; McGraw Hill; Wadsworth, Inc.; Harcourt Brace Jovanovich, Inc.; Random House, Inc.

Service to Virginia Tech:

Departmental Committees:

Scholarship, Service, Freshman-Sophomore, Undergraduate Program, Undergraduate Advisor, Colloquium, Teacher Evaluation, Graduate Program, Graduate Admission, Personnel Advisory, Program Advisory, Planning, Career Advisor, Coop Advisor, Semester Conversion, Math Education, MIPAC, Applied and Computational Mathematics Option.

Extension Activities:

Developed and team taught (with J.A. Burns) the graduate level course "Differential and Integral Equations: A Short Course," a special course presented at the Naval Research Laboratory, Washington, D.C., February 28 - March 4, 1977.

University Activities:

1996-2001 and 2008-2011, Commission on Research
2016 – 2022 High Performance Computing Investment Committee (Appointed by President Sands)