

S. S. Ravindran, Ph.D
Professor/IEEE Senior Member

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Research Expertise: Computational Fluid Dynamics, Flow Control and Optimization.

I. Professional Societies: IEEE Senior Member, SIAM member, IEEE Control System Society Member

II.1 Faculty Appointments

2021 Sep. - present	Graduate Program Director Department of Mathematical Sciences, University of Alabama, Huntsville
2020 Feb. - present	Interim Chair (acted as chair while the chair was away) Department of Mathematical Sciences, University of Alabama, Huntsville
2012 - present	Full Professor Department of Mathematical Sciences, University of Alabama, Huntsville
2005 - 2011	Associate Professor Department of Mathematical Sciences, University of Alabama, Huntsville
1999 - 2004	Assistant Professor Department of Mathematical Sciences, University of Alabama, Alabama
1997 to 1999	NRC Research Fellow , National Academy of Sciences, NASA Langley Research Center, Virginia
1994 to 1997	Visiting Assistant Professor , Department of Mathematics and Center for Research in Scientific Computation North Carolina State University, Raleigh, North Carolina

II.2 Visiting and Other Appointments

Visitor, ICERM, Brown University, July 2014, October 2014; **Jacobs Engineering**, October 2013- March, 2014; **Visitor, IISER**, TVM, 2012; **Visitor, IMA**, University of Minnesota, March 2003, March 2005, August 2005, Nov. 2010; June 2015; **Visitor, AIM**, Palo Alto, California, December 2007; **Visitor, SAMSI**, RTP, North Carolina, November 2007; **Visitor, MSRI**, University of California, Berkeley, October 2007; **Visitor, IPAM** UCLA, October 2007; **NASA Summer faculty fellow**, NASA Marshall Space Flight Center, 2003; 2006; 2009;2010;2012;2015;2019;2020 **Visiting Scientist**, ICASE, NASA Langley Research Center, May 1997.

III. Education

- Ph.D., Aug. 1994, **Simon Fraser University**, Vancouver, Canada
- M. Sc., May 1991, **University of British Columbia**, Vancouver, Canada
- B. Sc.(Hons), May 1987, **University of Jaffna**, Sri Lanka

IV. Awards, Distinctions and Honors

- IEEE Senior Member
- NASA MSFC Summer Faculty Research Fellowship: 2020 Summer, 2019 Summer, 2015 Summer, 2012 Summer, 2010 Summer, 2009 Summer, 2006 Summer, 2003 Summer, Huntsville, AL.
- Individual Investigator Distinguished Researcher Award, UAH, 2014
- NASA Glen Research Center Certificate of Recognition, NASA, 2010
- National Research Council (NRC) Post Doctoral Fellowship, USA, 1997–1999
- University Graduate Fellowship, SFU, Vancouver, Canada, 1993/94
- University President's Ph.D Dissertation Fellowship, SFU, Vancouver, Canada, 1993/94

V. Publications

V.1 Peer Reviewed Papers

- P- 1: S.S. Ravindran, A Higher Order Artificial Compression Reduced Order Model for Control of Thermally Convective Flows, Proceedings of European Control Conference, IEEE, Accepted, 24-26 June, 2025.
- P- 2: N.S. Raveendran, M.A. Aziz, S.S. Ravindran and M. Mohebujjaman "Efficient, Accurate, and Robust Penalty Projection Algorithm for parameterized Stochastic Navier-Stokes Problem", Applied Numerical Mathematics , Submitted, 2025.
- P- 3: S.S. Ravindran, "Chorin Projection Reduced Order Model for Control of Navier-Stokes Equations", Proceedings of 2025 American Control Conference , IEEE, 2025.
- P- 4: Arjun Garva, S.S. Ravindran, Parthasarathi Ghosh and Alok Majumdar, "Modelling of unsteady fluid transients induced by sudden valve closure in flow networks", Physics of Fluids, Accepted, 2025.
- P- 5: S.S. Ravindran, "Artificial Compression POD Reduced Order Model for Control of MHD Flows", Proceedings of 2024 American Control Conference , **IEEE**, pp. 3302-3307, 2024.
- P- 6: Arjun Garva, S.S. Ravindran, Parthasarathi Ghosh and Alok Majumdar, "Network Flow Analysis of Sudden Valve Closure-Induced Two-Phase Fluid Transients in Cryogenic Environment", Proceedings of International Conference on Advances in Aerospace and Energy Systems (IAES 2024), Thiruvananthapuram, India, 2024.
- P- 7: S.S. Ravindran, "Pressure Stabilized POD Reduced Order Model for Control of Viscous Incompressible Flows", Proceedings of 62st **IEEE** Conference on Decision and Control (CDC) , pp. 6205-6210, 2023
- P- 8: Arjun Garva, S.S. Ravindran, Parthasarathi Ghosh and Alok Majumdar, Numerical modelling of unsteady fluid transients due to sudden valve closure in flow networks, **AIAA 2023** AIAA Aviation Forum, San Diego, California, USA, 2023, Paper-4424.
- P- 9: Arjun Garva, Sivaguru S. Ravindran, Parthasarathi Ghosh, Alok K. Majumdar, "Numerical Analysis of Cavitation-Induced Two-Phase Fluid Transients in Cryogenic Feedlines Using Finite Volume Procedure", 30th Space Cryogenics Workshop, July 16-18, 2023, Kailua-Kona, Hawaii, USA.
- P- 10: S.S. Ravindran, "Time Adaptive POD Reduced Order Model for Viscous Incompressible Flows", **Proc. 61st IEEE Conf. Decision & Control**, 2022, pp.6105-6110.
- P- 11: S.S. Ravindran, "Finite Element Approximation of Dirichlet Control Problem for Boussinesq Equations Using Boundary Penalty Method", Submitted, 2024.
- P- 12: S.S. Ravindran, "Penalization of Dirichlet Boundary Control for Nonstationary Magneto-hydrodynamics", **SIAM Journal on Control and Optimization** (SICON), Vol. 58(4), pp. 2354-2382, 2020.
- P- 13: S.S. Ravindran, "An Analysis of the Crank-Nicolson Galerkin FEM for the Diffusive Peterlin Viscoelastic Model", **Numerical Functional Analysis and Optimization**, Volume 41:13, pp. 1611-1641, 2020.
- P- 14: S.S. Ravindran, "Efficient Long Time Stable Second Order Time-Stepping Scheme for Evolutionary Magneto-Micropolar Flows", **Computers and Mathematics with Applications**, Volume 79(5), 2020, pp. 1302-1320.
- P- 15: S.S. Ravindran, "An Efficient Second Order in Time Scheme for MHD System with Temperature Coefficients" , **IMA Journal of Numerical Analysis**, Volume 39, Issue 4, October 2019, pp. 1860-1887.
- P- 16: S.S. Ravindran, "Analysis of a Second Order Decoupled Time-Stepping Scheme for Transient Viscoelastic Flow", **International Journal of Numerical Analysis and Modeling**, Volume 17, Number 1, 2020, pp. 87-109.
- P- 17: S.S. Ravindran, "Analysis of a Decoupled Time-Stepping Scheme for Reduced MHD System Modeling Magneto-Convection", **Numerical Methods for Partial Differential Equations**, Volume 34(6), pp. 1953-1974, 2018.

- P- 18: S.S. Ravindran, "An Adaptive Approach for Prediction of Propellant Feedline Dynamics in Fluid Network", **International Journal of Numerical Methods for Heat and Fluid Flow**, Volume 28(6), pp. 1335-1351, 2018
- P- 19: S.S. Ravindran, "Finite Element Approximation of Dirichlet Control Using Boundary Penalty Method for Unsteady Navier-Stokes Equations", **ESAIM: M²AN**, Volume 51(3), pp. 825-849, 2017.
- P- 20: S.S. Ravindran, "A Decoupled Crank-Nicolson Time-Stepping Scheme for Thermally Coupled Magneto-hydrodynamic System", **An International Journal of Optimization and Control: Theories and Application**, Volume 8 (1), 2018, pp.43-62.
- P- 21: S.S. Ravindran, "An Extrapolated Second Order Backward Difference Time-Stepping Scheme for Magneto-hydrodynamic System", **Numerical Functional Analysis and Optimization**, Volume 37(8), pp. 990-1020, 2016.
- P- 22: S.S. Ravindran, "Analysis of a Decoupled Time-Stepping Scheme for Evolutionary Micropolar Fluid Flows", **Advances in Numerical Analysis**, Volume 2016, 2016.
- P- 23: S.S. Ravindran, "A Second-Order Backward Difference Time-Stepping Scheme for Penalized Navier-Stokes Equations Modeling Filtration Through Porous Media", **Numerical Methods for Partial Differential Equations**, Volume 32(2), pp. 681-705, 2016.
- P- 24: S.S. Ravindran, "Exact Boundary Controllability of Galerkin Approximations of Navier-Stokes System for Soret Convection", **An International Journal of Optimization and Control: Theories & Applications**, Volume 5(2), pp. 41-49, 2015.
- P- 25: S.S. Ravindran, "An analysis of blended three-step BDF time stepping scheme for Navier-Stokes type system related to Soret convection", **Numerical Functional Analysis and Optimization**, Volume 36(5), pp.658-686, 2015
- P- 26: S.S. Ravindran, "Dirichlet Control of Unsteady Navier-Stokes type System related to Soret Convection by Boundary Penalty Method", **ESAIM: Control, Optimisation and Calculus of Variations**, Vol. 20, pp. 840-863, 2014.
- P- 27: S.S. Ravindran, "Convergence of Extrapolated BDF2 Finite Element Schemes For Unsteady Penetrative Convection Model" **Numerical Functional Analysis and Optimization**, Vol. 33(1), pp. 48-79, 2012.
- P- 28: Alok Majumdar and S.S. Ravindran, "Numerical Prediction of Conjugate Heat Transfer in Fluid Networks", **AIAA Journal of Propulsion and Power**, Vol. 27(3), pp. 620-630, 2011.
- P- 29: S.S. Ravindran, "Design of Optimal Boundary Control for Non-stationary Doubly Diffusive Convective Flow", **2012 American Control Conference**, June 27-June 29, 2012.
- P- 30: S.S. Ravindran, "Error Analysis for Galerkin POD Approximation of the Non-stationary Boussinesq Equations", **Numerical Methods for Partial Differential Equations**, Vol.27, pp. 1639-1665, 2011.
- P- 31: Alok Majumdar and S.S. Ravindran, "Fast, Nonlinear Network Solvers for Fluid and Thermal Transients", **International Journal of Numerical Methods for Heat and Fluid Flow**, Vol. 16, pp. 617-637, 2010.
- P- 32: S.S. Ravindran, "Error Estimates for Reduced Order POD Models of Navier-Stokes Equations", **ASME International Mechanical Engineering Congress and Exposition**, Proceedings, Vol. 12, pp.651-657, 2009.
- P- 33: S.S. Ravindran, "Linear Feedback Control and Approximation for a System Governed by Unsteady MHD Equations", **Computer Methods in Applied Mechanics and Engineering**, Vol. 198, pp. 524-541, 2008.
- P- 34: S.S. Ravindran, "Dynamics of Controlled MHD System with Distributed Controls", **Nonlinear Analysis: Modelling and Control**, Volume 13(3) (2008), pp. 351-377.

- P- 35: S. S. Ravindran, "Optimal Boundary Feedback Stabilization of Fluid Flow by Model Reduction", **Computer Methods in Applied Mechanics and Engineering**, 196/25-28 pp. 2555-2569, 2007.
- P- 36: S. S. Ravindran, "Stabilization of Navier-Stokes Equations by Boundary Feedback", **International Journal of Numerical Analysis and Modeling**, Vol. 4, Number 3-4, pp. 608-624, 2007.
- P- 37: Alok Majumdar and S.S. Ravindran, "Numerical Modeling of Fluid Transients by a Second-Order Time Accurate Method for Rocket Propulsion Systems", **Proceedings of 54th JANNAF Propulsion Meeting**, May 14-17, Denver, USA, 2007.
- P- 38: S. S. Ravindran, "Reduced-Order Controllers for Control of Flow Past an Airfoil ", **International Journal for Numerical Methods in Fluids**, 50(5), pp. 531-554, 2006.
- P- 39: S. S. Ravindran, "Real Time Computational Algorithms for Optimal Control of an MHD Flow System" **SIAM Journal on Scientific Computing**, Vol. 26(4), pp. 1369-1388, 2005.
- P- 40: S. S. Ravindran, "Numerical Approximation of Optimal Control of Unsteady Flows using SQP and Time Decomposition", **International Journal for Numerical Methods in Fluids**, Vol. 45, pp. 21-42, 2004
- P- 41: S. S. Ravindran, "Control of Flow Separation Over a Forward-facing Step by Model Reduction" **Computer Methods in Applied Mechanics & Engineering**, Vol. 191 (41-42), pp. 4599-4617, 2002.
- P- 42: S. S. Ravindran, "Adaptive Reduced Order Controllers for a Thermal Flow System Using Proper Orthogonal Decomposition" **SIAM Journal on Scientific Computing**, Vol. 23 (6), pp.1925-1943, 2002.
- P- 43: S. S. Ravindran, "Time-Domain Decomposition Methods for Solving Optimal Flow Control Problems", **AIAA Paper 2002-3281**, 1st **AIAA Flow Control Conference**, St. Louis, 2002.
- P- 44: S. S. Ravindran, "Optimal Control of Solid-Fuel Ignition Model Using SQP Method" **41st IEEE Conference on Decision & Control, IEEE**, Vol. 3, 2002, pp. 3288-3293.
- P- 45: K. Ito and S. S. Ravindran, "Reduced Basis Method for Optimal Control of Unsteady Viscous Flows", **International Journal on Computational Fluid Dynamics**, 15, pp. 97-113, 2001.
- P- 46: S. S. Ravindran, "Active Control of Flow Separation Over an Airfoil", **Proceedings of the Third International Conference on Nonlinear Problems in Aviation and Aerospace**, Ed. S. Sivasundaram, pp. 569-578, 2001.
- P- 47: S. S. Ravindran, "Reduced-Order Adaptive Controllers for MHD Flows Using POD", **40th IEEE Conference on Decision & Control, IEEE**, Florida, V.3, pp 2454-2459, 2001.
- P- 48: S. S. Ravindran, "Reduced Order Adaptive Controllers for Fluids Using Proper Orthogonal Decomposition", **AIAA Paper 2001-0925**, Aerospace Sciences Meeting and Exhibit, 39th, Reno, NV, Jan. 8-11, 2001
- P- 49: S. S. Ravindran, "A Reduced-Order Adaptive Controllers for Fluid Flows Using POD" **Journal of Scientific Computing**, Vol.15 (4), pp. 457-478, 2000
- P- 50: S. S. Ravindran, "A Reduced Order Approach to Optimal Control of Fluids using Proper Orthogonal Decomposition", **International Journal for Numerical Methods in Fluids**, Vol. 34 (5), pp. 425-448, 2000.
- P- 51: L. S. Hou and S. S. Ravindran, "Numerical Approximation of Optimal Flow Control Problems by a Penalty Method: Error Estimates and Numerical Results" **SIAM Journal on Scientific Computing**, 20(5), pp. 1753-1777, 1999.
- P- 52: L. S. Hou and S. S. Ravindran, "Penalty Methods For Numerical Approximations of Optimal Boundary Flow Control Problems", **International Journal on Computational Fluid Dynamics**, 11, pp.157-167, 1999.
- P- 53: K. Ito and S. S. Ravindran, "A Reduced Order Method for Simulation and Control of Fluid Flows", **Journal of Computational Physics**, 143(2), pp. 403-425, 1998.

- P- 54: L. S. Hou and S. S. Ravindran, "A Penalized Neumann Control Approach for Solving an Optimal Dirichlet Control problem for the Navier-Stokes Equations", **SIAM Journal on Control & Optimization**, **36**(5), pp. 1795–1814, 1998.
- P- 55: K. Ito and S. S. Ravindran, "A Reduced Order Methods for Control Problems Governed by PDEs" **International Series of Numerical Mathematics**, **V. 126**, pp. 153-168, 1998.
- P- 56: K. Ito and S. S. Ravindran, "Optimal Control of Thermally Convected Fluid Flow", **SIAM Journal on Scientific Computing**, **19**(6), pp. 1847-1869, 1998.
- P- 57: S. S. Ravindran, "Numerical Approximation of Optimal Flow Control Problems by SQP Method", **Optimal Control of Viscous Flows**, Ed. S. S. Sritharan, *SIAM Proceedings in Applied Mathematics*, **SIAM**, pp. 181–198, 1998.
- P- 58: Max Gunzburger, L. S. Hou and S. S. Ravindran, "Finite Element Approximation of Some Optimal Control Problems for a Ginzburg-Landau Model for Superconductivity", **Numerische Mathematik**, **77**(2), pp. 243–268, 1997.
- P- 59: S. S. Ravindran, "Numerical Solution of Optimal Control for Thermally Convected Fluid Flow", **International Journal for Numerical Methods in Fluids**, **25**(2), pp. 205–223, 1997.
- P- 60: L. S. Hou, S. S. Ravindran and Y. Yan, "Numerical Solutions of Optimal Distributed Control Problems for Incompressible Flows", **International Journal on Computational Fluid Dynamics**, **8**(2), pp. 99–114, 1997.
- P- 61: K. Ito and S. S. Ravindran, "Reduced Order Methods for Nonlinear Infinite Dimensional Systems", **Proc. 36th IEEE Conf. Decision & Control**, **IEEE**, Vol.3, pp. 2213-2218, 1997.
- P- 62: L. S. Hou and S. S. Ravindran, "Computations of Boundary Optimal Control Problems for an Electrically Conducting Fluid", **Journal of Computational Physics**, **128**(2), 1996, pp. 319–330.
- P- 63: K. Ito and S. S. Ravindran, "Reduced Order Method for Control of Fluid Flows", **Proc. 35th IEEE Conf. Decision & Control**, **IEEE**, V.4, pp.3705-3710, 1996.
- P- 64: K. Ito and S. S. Ravindran, "Optimal control of compressible Navier-Stokes equations" **Proc. 35th IEEE Conf. Decision & Control**, **IEEE**, V.4, 1996, pp.3700-3704.
- P- 65: S.S. Ravindran, "Numerical Solution of Optimal Boundary Control of Navier-Stokes Flows", AIAA Paper 96-4048, **6th Symposium on Multidisciplinary Analysis and Optimization**, pp. 624-632, 1996.
- P- 66: L. S. Hou and S. S. Ravindran, "Finite Element Approximation for Optimal Control of Electrically Conducting Fluids", **Proceedings of Symposia in Applied Mathematics**, **V. 48**, 1995, pp. 305–309.
- P- 67: H.T. Banks, C. Bachman, K. Ito, S. S. Ravindran and Jeff Scroggs, "High Pressure Vapor Transport of ZNGEP2: II Three dimensional simulations of gas dynamics under micro-gravity conditions", **124th TMS Annual Meeting, 7th international symposium on Experimental Methods for Micro-gravity Materials Science**, Las Vegas, NV, 1995, pp. 67-72.
- P- 68: S.S. Ravindran and S.S. Sritharan, "Electromagnetic control of fluid flows," Proceedings of the Society of Engineering Sciences Meeting, New Orleans, Louisiana, 1995, pp. 579-580, edited by David Hui and Stathis Michaelides.
- P- 69: K. Ito and S. S. Ravindran, "Optimal Control of Thermally Coupled Navier-Stokes Equations", **Proc. 34th IEEE Conference on Decision & Control**, **IEEE**, V.1, 1995, pp.461-466.
- P- 70: M. Gunzburger, L. Hou, S. S. Ravindran and J. Turner, "Analysis and approximation of optimal control problems nonlinear constraints", **Proc. 33th IEEE Conf. Decision & Control**, **IEEE**, Lake Buena Vista, Vol. 1, 1994, pp. 299-304.

V.2 Publication in Technical Reports

- T- 1: A.K. Majumdar and S.S. Ravindran, An Explicit Time Stepping Scheme for Generalized Flow Simulation System Program, NASA technical Memorandum, NASA/TM-20210024456, pp. 22-26, 2021.
- T- 2: S.S. Ravindran and Alok Majumdar, "A Preconditioned Quasi-Minimal Residual Algorithm for Solving Large Scale Network Flow Problems with GFSSP", NASA/TM 20205003520, p.55-62, 2020
- T- 3: A.K. Majumdar and S.S. Ravindran, "Adaptive Time Stepping for Transient Network Flow Simulation in Rocket Propulsion Systems", ID. 20170008976, M17-5801, 20p, NASA MSFC, JUL 10, 2017.
- T- 4: S. S. Ravindran, "Adaptive Time Stepping Scheme for Enhancing Transient Simulation Capability of GFSSP", NASA/TM-2015-218216, pp. 93-101, 2015.
- T- 5: S. S. Ravindran, "Development of a Rocket Engine Combustion chamber Cooling Module for the ROCETS Modeling System", NASA Contract Report, NASA/CR-2004-2132285, pp. XXXIII-1, XXXIII-5.
- T- 6: S. S. Ravindran, "Proper Orthogonal Decomposition in Optimal Control of Fluids", NASA Technical Memorandum, NASA TM 1999-209113, 1999.
- T- 7: S. S. Ravindran, "Proper Orthogonal Decomposition in Optimal Control of Fluids: Suitably formulated reduced-order mathematical models can be satisfactory approximations for purposes of control", **NASA Tech Briefs**, L17846, October 1999.

VI. Professional Leadership and Service

VI.1 Professional Society Memberships Society for Industrial & Applied Mathematics (**SIAM**); Institute of Electrical and Electronics Engineers; American Mathematical Society (AMS); ASME

VI.2 Editorial Boards:

Editor-in-Chief, Engineering Mathematics Letters; Associate Editor, Automation and Control Systems Journal; Associate Editor, Mathematical Problems in Engineering

VI.3 Review Panel:

Multi-scale Mathematics, U.S. Department of Energy (DOE) Grant Review Panelist, 2008; National Science Foundation (NSF) Grant Review Panelist, 2005; U.S. Department of Energy (DOE) Grant Review Panelist, 2005; National Science Foundation Graduate Research Fellowship Program Panelist, 2014; National Science Foundation Graduate Research Fellowship Program Panelist, 2016; National Science Foundation Graduate Research Fellowship Program Panelist, 2017,2018,2019

VI.4 Manuscript Referee for:

Mathematical Reviews; **SIAM** Journal on Numerical Analysis; Journal of Computational Physics; **SIAM** Journal on Control & Optimization; Proceedings of IEEE Conference on Decision & Control; Systems & Control Letters; IEEE Transactions on Automatic Control; International Journal of Control; Journal Mathematical and Computer Modeling; Proceedings of American Control Conference; Numerical Methods for Partial Differential Equations; AIAA Journal; International Journal of Computational Fluid Dynamics; Computers & Fluids; Journal of the Franklin Institute; International Journal of Computational Engineering Science; International Journal of Innovational Computing and Information Control; IET Control Theory and Applications; International Journal for Numerical Methods in Fluids; Computer Methods in Applied Mechanics and Engineering; Journal of Computational Physics; International Journal for Heat and Mass Transfer; AIAA Journal of Guidance and Control; SIAM Journal of Scientific Computing

Book manuscript Reviewer for:

Differential Equations, Pearson Education; Elementary Differential Equations by Werner Kohler, Addison-Wesley; Lectures on the Approximation of Large-Scale Dynamical Systems by A.C. Antoulas, **SIAM**, 2002; Introduction to Numerical Differential Equations Using MATLAB by Alexander Stanoyevitch, John Wiley & Sons, Inc., 2003.

VI.5 Conference Organization

Organizer and Chair:

Minisymposium on Recent Developments in Control of Fluids - Parts I-III,
2023 SIAM Conference on Control and Its Applications, Philadelphia, July 24-26, 2023, Pennsylvania.

Organizing Committee:

International Conference on Intelligent Computing and Technology Applications, July 24-26, 2023, Shanhai, China.

Organizer and Chair:

Minisymposium on Recent Advances in Numerical Algorithms for Systems Modeled by PDEs - Parts I-IV,
2022 SIAM Annual Meeting, Pittsburgh, July 11-15, 2022, Pennsylvania.

Session Chair:

Numerical Methods in Fluids,
2021 SIAM Annual Meeting, Seattle, Washington, USA, July 2021.

Organizer and Chair:

Minisymposium on Recent Advances in Numerical Algorithms for PDEs - Parts I-III,
44th SIAM Southeast Atlantic Meeting, Auburn University, September 18-21, 2021, Alabama.

Organizer; Special Session

Minisymposium on Recent Developments in Numerical Algorithms for PDEs - Parts I-III,
44th SIAM Southeast Atlantic Meeting, Auburn University, September, 2020, Alabama.

Organizer; Special Session

Special Session on Numerical Methods for Nonlinear Partial Differential Equations, (Parts I-IV)
2015 AMS Southeastern Sectional Meeting, Huntsville, Alabama, March 2015.

Organizer/Chair; Mini-symposium

Stochastic Analysis, Control and Computation of Fluid Dynamics and other Physical Phenomena, (Parts I-IV)
2013 SIAM Annual Meeting, San Diego, California, July 2013,
(Co-organizers: Meng Xu and Nathan Moshman)

Organizer/Chair; Conference

2012 SIAM Southeastern Atlantic Section Conference University of Alabama in Huntsville, March 24-25, 2012

Organizer/Chair; Mini-symposium

*Advances in Control of Fluid Dynamics and Challenges facing
the US Defence Department's thrust on Unmanned Autonomous Systems (Parts I-IV)*
2011 SIAM Conference on Control and Its Applications, Baltimore, July 2011; (Co-org:S.S.Sritharan)

Organizer/Chair; Mini-symposium

Advances in Reduced Order Modeling (Parts I, II & III)
2010 SIAM Annual Meeting, Pittsburgh, USA, July 2010

Organizer/Chair; Mini-symposium

Stochastic Multi-Scale Methods (Parts I & II) 2006 SIAM Annual Meeting, Boston, USA, July 2006

Organizer/Chair; Mini-symposium

Control of Partial Differential Equations (Parts I & II)
2005 SIAM Conference on Control & Its Applications, New Orleans, June 2005; (Co-org: K. Ito)

Organizer/Chair; Mini-symposium

Control of Fluid Dynamical Systems (Parts I & II): Theory and Numerics
2003 SIAM National Annual Meeting, Montreal, Canada June 2003, (Co-org. S.S. Sritharan)

Organizer/chair; Mini-symposium

Advances in Dynamic Control of Fluids (Parts I & II): Theory, Numerics & Applications
2002 SIAM National Annual Meeting, Philadelphia, USA, July 2002, (Co-org. S.S. Sritharan)

Organizer; Mini-symposium

Control of Fluids: Theory & Numerics (Parts I,II, & III)
2001 SIAM Conference on Control & Its Applications, San Diego, July 2001, (Co-org. S.S. Sritharan)

Organizer; Mini-symposium

Advances in Optimal Flow Control (Parts I,II,III & IV); 2000 SIAM National Annual Meeting
Rio Grande, Puerto Rico, July 2000 (Co-organizers P. Sundar & S.S. Sritharan)

Organizer; Mini-symposium

Numerical Methods for Optimal Design & Control
6th SIAM Conference on Optimization, Atlanta, Georgia, May 1999 (Co-Organizer Eyal Arian)

Organizer; Mini-symposium (Parts I,II & III)

Advances in Theoretical & Numerical Methods in Control of Fluids

SIAM National Annual Meeting, Atlanta, May 1999 (Co-org. P. Sundar & S.S. Sritharan)

Organizer; Mini-symposium (Parts I,II & III)

Advances in Optimal & Feedback Control of Fluid Flows

1998 **SIAM** Conference on Control & Its Applications, Florida, USA, May 1998,
(Co-organizer S.S. Sritharan)

Organizer & Session Chair; Mini-symposium

Optimal Design & Control in Fluid Flows

35th National Meeting of the Society of Engineering Science, Pullman, WA, September 1998

Organizer; Mini-symposium (Parts I,II & III)

Advances in Optimal Flow Control

1997 **SIAM** National Annual Meeting, Stanford, California, USA, July 1997, (Co-org. S.S. Sritharan)

Organizer; Mini-symposium (Parts I,II & III)

Control & Computational Fluid Dynamics

1995 **SIAM** National Annual Meeting, Charlotte, North Carolina, USA, Oct. 1995 (Co-org. K. Ito)

VI. 6 Sessions Chaired at International Conferences

Session Chair; Contributed Session

Control & Computational Fluid Dynamics

1995 **SIAM** National Annual Meeting, Charlotte, North Carolina, USA, Oct. 1995

Session Chair

Boundary Control

1998 **IEEE** Conference on Decision & Control, Tampa, Florida, December, 1998

Session Chair; Contributed Session

Model Reduction & Data Assimilation

SIAM conference on Computational Science & Engineering, Washington D.C., USA, September 2000

VI.7 Organizer of Distinguished Speaker Lectures:

- Prof. Irena Lasiecka, Distinguished University Professor of mathematics and chair of the mathematics department at the University of Memphis, January 2024
- Prof. Irene Foseca, Kavcic-Moura University Professor of Mathematics, Director, Center for Nonlinear Analysis, Carnegie Mellon University, August, 2024
- Prof. Peter Lax, Abel Laureate, NYU April 11, 2011
- Prof. Max Gunzburger, Francis Eppes Distinguished Professor, Florida State University February 13, 2004
- Prof. John Burns, Hatcher Professor, Virginia Tech November 18, 2008
- Prof. Craig Tracy, Distinguished Professor, UC Davis November 16, 2012

VI.8 Evaluator of hiring, tenure, and promotion cases Several letters written in response to requests to evaluate personnel being considered for hiring or tenure and/or promotion by other institutions in the US.

VII. Research Grants

- PI, "Advanced Adaptive Methods for Network Flow Simulations", NASA CAN Award, Awarded, \$50,000, 2024-2025.
- PI, "Second Order Adaptive Time Stepping Methods for Transient Simulations in GFSSP", NASA MSFC, Awarded, \$45,000, 2024.
- PI, "Adaptive Time Stepping Methods for Transient Simulations in Fluid Netwrks", NASA MSFC, Awarded, \$30,000, 2022.
- Principal Investigator, "High resolution methods with explicit time discretization for the simulation of fluid transients in GFSSP", NASA Tech Excellence, NASA MSFC, \$25,000, 2020.
- Principal Investigator, Adaptive Time Stepping Schemes for GFSSP Simulations, NASA MSFC (Summer Faculty program), \$19,000, May-August, 2019.
- Principal Investigator, "Variable Step-Size Control for Long Time Transient Simulation of Cryogenic Heat Transfer", NASA grant (#NNM16AA06A), \$62,000 (50% costshare), 2016-2018.
- ICM 2018 travel grant, \$3,300, 2018.
- Principal Investigator, Adaptive Time Stepping Schemes for GFSSP Simulations, NASA MSFC (Summer Faculty program), \$19,000, May-August, 2015.
- Principal Investigator, "Optimal Feedback Control of Flow Induced Instabilities by Large Eddy Simulations", CCFR Program, UAH, \$5,000, August, 2014-August, 2015. (Co-Investigator Sarma Rani, Dept. MAE, UAH)
- Principal Investigator, "POD Closure Models for Prediction and Control of Turbulent Flows", Individual Investigator Distinguished Research Program, UAH, \$19,350, May, 2014-May, 2015.
- Co-Investigator, "Temporally- and Spatially-Resolved Digital Imaging Diagnostics for the Evaluation of Liquid Rocket Injector Dynamics and Combustion Stability Phenomena". URII, \$96,358, May, 2012-May, 2013, (PI: Robert Friedrich, MAE department).
- Principal Investigator, "Incorporation of Efficient Solver in Generalized Fluid System Simulation Program for Multi-Dimensional Flow Models", NASA MSFC, \$17,000, 2012
- Co-Principal Investigator, Fast Thermal Calculations for Responsive Targets in Support of Real-Time Scene Generation, Department of Defence STTR Grant, Total: \$100,000; UAH part \$30,000, 2011-2012. (PI-Steve Hartley, MTSI)
- Principal Investigator, 36th annual SIAM-SEAS conference grant from SIAM, March 24-25, 2012 \$4,600
- Co-Investigator, "Global Extrapolation of Solar Coronal Magnetic Field from Solar Dynamics Observatory Measurements", UAH URII grant, Total: \$55,493.00 (PI-Qiang Hu, CSPAR, UAH), 2011-2012.
- Principal Investigator, "Multi-dimensional Network Flow Simulation by GFSSP", NASA Grant, \$15,000, 5/1/2010-6/30/2011
- UAH Distinguished Speaker Grant, UAH, \$1,500, 2011; Speaker: Prof. Peter D. Lax, Abel Laureate.
- Principal Investigator, NASA Summer Faculty Program, NASA Space Transportation Program, \$15,000, summer 2010.
- Principal Investigator, NASA Summer Faculty Program, NASA Space Transportation Program, \$15,000, summer 2009.
- Principal Investigator, UAH Distinguished Speaker Grant, UAH, \$1,500, 2008; Speaker: Prof. John A. Burns, Hachet Professor.

- Principal Investigator, Higher Order Accurate Methods for Numerical Modeling of Thermofluid, NASA 23842, \$100,000, 2006-2009.
- Principal Investigator, NAG8-1904, NASA Summer Faculty Program, NASA Space Transportation Program, \$12,000, 2006.
- Principal Investigator: S.S. Ravindran, NSF Grant DMS 0421945, SCREMS, \$145,000, 2004–2008.
- Principal Investigator, NAG8-1906, NASA Summer Faculty Program, NASA Space Transportation Program, \$12,000, 2003.
- Principal Investigator, UAH Mini-grant, \$7,000, 2001.
- Co-Principal Investigator (with Kyle Siegrist), UAH Distinguished Speaker Grant, UAH, \$2,000, 2003; Speaker Prof. Max Gunzburger, Eppes Professor.
- Principal Investigator, National Research Council/NASA Langley (NASW-8154), for “Active control of flow separation”, 1997-1999.

VIII Talks

VIII.1 Invited Presentations at Conferences

- IP1 Invited speaker in a American Control Conference special session “Estimation and Control of Distributed Parameter Systems”, December 2024, Toronto, USA.
- IP1 Invited speaker in a IEEE CDC special session “Estimation and Control of Distributed Parameter Systems”, December 2023, Singapore, USA.
- IP1 Invited speaker in a IEEE CDC special session “Estimation and Control of Distributed Parameter Systems”, December 2022, Cancun, Mexico, USA.
- IP1 Invited speaker in a IEEE CDC special session “Estimation and Control of Distributed Parameter Systems”, December 2018, Miami, USA.
- IP2 Invited speaker in a IEEE CDC special session “Estimation and Control of Distributed Parameter Systems”, December 2017, Melbourne, Australia.
- IP3 Invited speaker in a minisymposium on “Reduced Order Models for PDE Constrained Optimization Problems”, SIAM Conference on Computational Science and Engineering, March 14-March 18, 2015, Salt Lake City, Utah; Organizers: Bernard Haasdonk and Andrea Manzoni.
- IP4 Invited speaker in a minisymposium on “Nonlinear Model Reduction of Complex Flows: Modeling, Analysis, and Computations”, SIAM Conference on Computational Science and Engineering, February 25-March 1, 2013; Organizers: Traian Iliescu, Zhu Wang.
- IP5 Invited speaker in a special session on “Estimation and Control of Distributed Parameter Systems”, Organizers: Micheal Dimetriou, 2012 American Control Conference, Montreal, Canada, June 27-29, 2012.
- IP6 Invited speaker in a session on Session on Analysis and Control under Uncertainty, Organizers: Catalin Trencea, X. Wang, Y. Cao, AMS joint meetings, January 2010, San Fransisco.
- IP7 Invited speaker in a conference Industrial Applications of Low Order Models Based on Proper Orthogonal Decomposition (POD), BORDEAUX, France, March 31-April 2, 2008.
- IP8 Invited Speaker for a session in finite element methods for flow control and optimization, to be held at the of the 14th International Conference on Finite Elements in Flow Problems, Santa Fe, New Mexico, March 26-28, 2007.
- IP9 Invited Speaker for a mini-symposium on “Control Theory for Fluid Flows”, Org.: Scott David Kelly and Banavara Shashikanth, *SIAM Conference on Control and its Applications*, New Orleans, July 2005.
- IP10 Invited participant for a special session in the IMA workshop on “New Paradigms in Computation”, March 28-30, 2005”, Institute for Mathematics and Its Applications, Minneapolis, Minnesota

- IP11 Invited Speaker for a mini-symposium on "Reduced Order Modeling of Large Scale Systems", Org.: Max Gunzburger, *SIAM Conference on Computational Science and Engineering*, Orlando, February 12-15, 2005.
- IP12 Invited Speaker for a mini-symposium on "Computational Issues in Control of Complex Flows", Orgs: Jeff Borggaard and Traian Iliescu, *2004 SIAM Annual Meeting Meeting*, Portland, July 12-16, 2004.
- IP13 Invited Speaker for a special session in *ICNPAA-2004 Fifth International Conference on "Mathematical Problems in Engineering and Aerospace Sciences"*, West University of Timisoara, Romania, June 2-4, 2004.
- IP14 Invited Speaker for a special session on "Numerical Partial Differential Equations", ISAAC 4th Congress, Toronto, ON, Aug. 11-16, 2003.
- IP15 Invited Speaker for a Mini-symposium on in "Numerical Methods and Stochastic Systems", Conference on Neural, Parallel, and Scientific Computations, August 7-10, 2003 in Atlanta, Georgia
- IP16 Invited Speaker for a special session in the IMA workshop on "Optimization in Simulation Based Models", Winter 2003, Institute for Mathematics and Its Applications, Minneapolis, Minnesota
- IP17 Invited Speaker for special session in "Numerical Methods and Stochastic Systems", Conference on Neural, Parallel, and Scientific Computations, August 7-10, 2002 in Atlanta, Georgia
- IP18 Invited Speaker for a Mini-symposium on "Advances in Dynamic Control of Fluids: Theory, Numerics and Applications", *Annual SIAM National Meeting, Philadelphia, 9 July 2002*
- IP19 Invited Speaker for a special session on "Advances in Flow Control", Org: Mohamed Gad-el-Hak and S.S. Sathar, *2002 Division of Fluid Dynamics Meeting*, American Physical Society, Nov. 24-26, 02
- IP20 Invited Speaker for a special session in *41st IEEE Conference on Decision & Control, IEEE, Las Vegas, Nevada, 2002*
- IP21 Invited Speaker for a Mini-symposium on "Control of Fluids: Theory and Numerics", **SIAM** Control Meeting, July, 2001
- IP22 Invited Speaker for a Workshop: *NSF Workshop on Control of Flows* UCSD, San Diego, May 31-June 1, 1999.
- IP23 Invited Speaker for a Mini-symposium on "Advances in Optimal Flow Control", Annual **SIAM** National Meeting, July 2000, Puerto Rico, USA.
- IP24 Invited Speaker for a Mini-symposium on "Advances in Optimal Flow Control", Annual **SIAM** National Meeting, San Francisco, July 1997
- IP25 Invited Speaker for a Workshop: ICASE Workshop on "Computational Modeling of Active Flow Control" NASA Langley Research Center, Virginia, May 27-29, 1997.
- IP26 Invited Speaker for a special session in International Conference on Nonlinear Problems in Aviation & Aerospace Florida, USA, May 9-11th, 1996
- IP27 Invited Speaker for a Mini-symposium in 34th Conference on Decision & Control, **IEEE**, New Orleans, December 1995
- IP28 Invited Speaker for a Mini-symposium in the 3rd **SIAM** Conference on Control & its Applications, St Louis, Missouri, April 1995
- IP30 Invited Speaker for a Mini-symposium titled "Theoretical and Computational Approaches in Fluid Flow Control" in the **SIAM** National Annual Meeting, San Diego, July 1994.

VIII.2 Contributed Presentations at Conferences

- CP1 "Finite Element Approximation of Dirichlet Control Using Boundary Penalty Method for Unsteady Magnetohydrodynamics", 2021 SIAM Annual Meeting, Spokane, WA, July 19-23, 2021.
- CP2 "Analysis of stabilized Crank-Nicolson time-stepping scheme for the evolutionary Peterlin viscoelastic model", UNC Greensboro PDE Conference of 2021.
- CP3 "Penalization of Dirichlet Boundary Control for Nonstationary Magneto-Hydrodynamics", 40th SEARCDE, Raleigh, NC, [POSTPONED to Fall 2021]
- CP4 "A Machine Learning Algorithm for Fluid Flow Control", *Contributed presentation*, 2020 Technological Advances in Science, Medicine and Engineering Conference, Toronto, Aug. 22-23, 2020.
- CP5 *Contributed presentation*, 39th SEARCDE, Orlando, Florida, Oct. 26-27, 2019.
- CP6 *Contributed presentation*, ICIAM, Nice, France, July 15-19, 2019.
- CP7 Finite element approximation of Dirichlet control using boundary penalty method for unsteady Navier-Stokes equations, *Contributed presentation*, Spring Southeastern Sectional Meeting, Nashville, Tennessee, April 14-15, 2018.
- CP8 *Contributed presentation*, 1st Biennial Meeting of SIAM Pacific Northwest Section, Oct. 27-29, 2017.
- CP9 *Contributed presentation*, The 37th Southeastern-Atlantic Regional Conference on Differential Equations (SEARCDE 2017) October 7-8, 2017, Kennesaw State University Kennesaw, GA, U.S.A.
- CP10 *Contributed presentation*, SIAM Conference on Analysis of Partial Differential Equations, Dec. 7-10, 2015, Scottsdale, Arizona.
- CP11 *Contributed presentation*, 1st **AIAA** Flow Control Conference, 24-27 Jun 2002, St. Louis
- CP12 *Contributed presentation*, 39th **AIAA** Aerospace Sciences Meeting & Exhibit, 8-11 Jan 01, **AIAA**, Reno, NV.
- CP13 *Contributed presentation*, 40th **IEEE** Conference on Decision & Control, **IEEE**, Florida, 2001
- CP14 *Contributed presentation*, 2001 Annual Meeting of the Division of Computational Physics, American Physical Society, June 25 - 28, 2001
- CP15 *Contributed Session talk*, **SIAM** Conference on Computational Science & Engineering, August 2000, Washington D.C.

VIII.3 Lecture Series/Short Courses

- L1 Lecture Series (6 hour lectures) in a Winter School on Stochastic Analysis and Control of Fluid Flows, IISER/Tata Institute of Fundamental Research, Thiruvananthapuram, India, December 3-20, 2012; Organizers: Utpal Manna and S. Dharmatti

VIII.4 Colloquia and Seminars

- 2017 Applied Mathematics Meeting, University of Alabama in Birmingham, November 4, 2017.
- *Mechanical and Aerospace Engineering Colloquium* (invited by Prof. K. Frendi), University of Alabama in Huntsville, AL, October 1, 2010
- *UA System Applied Mathematics Meeting Faculty Talk* (invited by Prof. K. Siegrist), University of Alabama in Tuscaloosa, AL, October 30, 2010
- *Mathematics Colloquium* (invited by Dr. D. Wu), University of Alabama, Huntsville, AL, February, 2010
- *Mathematics Colloquium* (invited by Dr. S. Ai), University of Alabama, Huntsville, AL, April, 2006
- *Mathematics Colloquium* (invited by Prof. M.H. Chang), University of Alabama, Huntsville, AL, February, 1999

- *Mathematics Colloquium* (invited by Prof. John L Hayden), Bowling Green State University, OH, February, 1999
- *Mathematics Colloquium* (invited by Prof. John B. Conway), University of Tennessee, Knoxville, February, 1999
- *Mathematics Colloquium*(invited by Prof. David Wollkind), Washington State University, Pullman, March, 1999
- *Mathematics Colloquium* (invited by Prof. J. Castillo), San Diego State University, San Diego, March, 1999
- *Mathematics Colloquium* (invited by Prof. Steven Leon), University of Massachusetts, Dartmouth, March, 1999
- *Mathematics Colloquium* (invited by Prof. John Chadam), University of Pittsburgh, Pittsburgh, PA, February, 1998
- *Mathematics Colloquium* (invited by Prof. Homer Walker), Worcester Polytechnic Institute, Worcester, MA, February, 1998
- *Numerical Analysis Seminar* (invited by Prof. J. Castillo), San Diego State University, San Diego, August, 1996
- *Seminar talk* (Prof. S.S. Sritharan), NReD, US Naval Lab, San Diego, February 1995
- *Numerical Analysis Seminar*(invited by Prof. Steven Campbell), North Carolina State University, Raleigh, August, 1994
- *Seminar talk* (invited by Prof. Parviz Moin), Center for Turbulence Research, Stanford University, Stanford, Dec. 1994

IX. Workshops

- Fractional PDEs: Theory, Algorithms and Applications, ICERM, Brown University, Rhode Island, June 18-22, 2018.
- Computational Methods for Control of Infinite-dimensional Systems, IMA, University of Minnesota, March 2016.
- Introduction to Uncertainty Quantification, IMA New Direction Short Course, University of Minnesota, June 15-26, 2015.
- 2015 IMA Hot Topics Workshop on Uncertainty Quantification in Materials Modeling, held at Purdue University in Lafayette, Indiana.
- Mathematics of Data Analysis in Cybersecurity, ICERM, Brown University, October 22-24, 2014.
- Challenges in 21st Century Experimental Mathematical Computation, ICERM, Brown University, July 21-25, 2014
- IMA Hot Topics workshop: Uncertainty Quantification in Industrial and Energy Applications, University of Minnesota, June 2-4, 2011.
- IMA Special Event: Finite Element Circus Featuring a Scientific Celebration of Falk, Pasiak and Walbin, University of Minnesota, Nov. 5-6, 2010.
- CDI workshop, American Institute of Mathematics, Palo Alto, Dec. 17-19, 2007
- Cyber-Enabled Discovery and Innovation: Knowledge Extraction, SAMSI, North Carolina, Nov. 2007
- Computation and Complex Systems, MSRI, Berkeley, October 12, 2007

- Workshop on Mathematics of Quantum Computation and Quantum Technology, University of Texas, College Station, Texas Nov. 2005
- IMA New Directions Short Course on "Quantum Computation", Minnesota, August 2005
- IMA/RMMC workshop on Stochastic PDEs and Environmental and Geophysical Modeling, University of Wyoming, Laramie, Wyoming, June 2005
- IMA workshop on New Paradigms in Computation, Minnesota, Winter 2005
- IMA workshop on Optimization Methods for Simulation, Minnesota, Winter 2003
- NSF workshop on Flow Control, University of California, San Diego, May 1999

X. COMPUTER SKILLS

Computers:

Linux Cluster

CRAY: C-90

IBM: RISC6000

SUN: Sparc, Ultra

Softwares:

Computational Fluid and Grid Generation: FENICS, OpenFOAM, CFL3D

Thermal/fluid/mechanical system design and analysis tool: GFSSP

Visualization: PARAVIEW, FAST, TECPLOT

Symbolic Computation: MATLAB, MATHEMATICA, MAPLE

Languages:

Fortran 77/90

C, C++

MS Word, HTML, Latex, Tex,

Microsoft Excel, Power Point

Operating Systems:

Linux Cluster : Scylid

CRAY: UNICOS

SUN: SOLARIS

PC: Windows 98, 2000 & XP