

Curriculum Vitae

Louis F. Rossi

Contact information

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Education

B.S. Mathematics. Harvey Mudd College. 1988.
M.A. Mathematics. University of California Berkeley. 1990.
Ph.D. Applied Mathematics. University of Arizona. December 1993.
Dissertation: *A Spreading Blob Vortex Method for Viscous Bounded Flows.*
Adviser: B. J. Bayly.

Academic Employment

Aug 2020-present **Dean of the Graduate College & Vice Provost for Graduate and Professional Education**
University of Delaware

Jan 2015-Aug 2020 **Chair**
Department of Mathematical Sciences
University of Delaware

Aug 2011-present **Professor**
Department of Mathematical Sciences
University of Delaware

Aug 2012-present **Professor** (joint appointment). Department of Computer and Information Sciences.
University of Delaware.

Aug 2004-Aug 2011 **Associate Professor**
Department of Mathematical Sciences
University of Delaware

Jan 2001-Aug 2004 **Assistant Professor**
Department of Mathematical Sciences
University of Delaware

1996-Dec 2000 **Assistant Professor**
Department of Mathematical Sciences
University of Massachusetts Lowell

1994-1996 **NSF Postdoctoral Fellow**
Department of Engineering Sciences and Applied Mathematics &
Department of Mechanical Engineering
Northwestern University

Honors and Awards

- 2007** University of Delaware Outstanding Assessment Fellow Award
- 2005** University of Delaware Exemplary Use of Technology in Teaching Award, Honorable Mention
- 1999** Department of Mathematical Sciences Faculty Teaching Award, UMass Lowell
- 1993** SIAM Student Paper Prize
- 1988** Nominated to Sigma Xi

University and Professional service

2022	Provost Search Committee, Member
2019-2021	Middle States Accreditation, Co-Chair of Assessment Working Group, Member of Steering Committee
2016-present	UD Advance, Internal Advisory Board
2017-2019	Data Science Cluster Search Committee, Member – Foundations Subcommittee, Chair
2017-2018	Integrated Science Learning Laboratory Director Search Committee, Chair
2017-2018	University of Delaware Budget Model Steering Committee
2017-2018	University of Delaware Budget Model Undergraduate Tuition Subcommittee
2017-2018	Chair's Caucus Steering Committee, Chair
2015-2017	Chair's Caucus Steering Committee, Member
2016-2018	University of Delaware Data Science Working Group
2015-2016	Ad Hoc Committee to Revise Article 3 of the Board of Trustee's Bylaws.
2015-2016	University of Delaware Admissions Guidelines Revision48 Committee.
2010-2014	Director of Undergraduate Studies, Department of Mathematical Sciences
2011-2016	Section Editor, SIAM Review (Education Section).
2010-2011	Chairman, Committee on Committees and Nominations, College of Arts & Sciences.
2005-2010, 2016-2018	Associate Editor, SIAM Review (Education Section).
2006-2011	Associate Editor, SIAM Undergraduate Research Online.
2007, 2009, 2011, 2014	Panel reviewer, National Science Foundation.
2009, 2012, 2015	Local organizing committee chair, Mathematical Problems in Industry workshop.
2006-2011	Department of Mathematical Sciences Assessment Fellow.
2008-2009	Mathematical Sciences Assessment Committee. (Chair 2008-2009).
2008-2009	Chairman, Mathematical Biology Search Committee.
2009-2011	Sakai Learning Management System Committee.
2009	Research Computing Task Force.
2007-2009	Secretary/Treasurer, UD Chapter of Sigma Xi.
2006-2014	Ad-hoc Mathematical Biology Steering Committee.
2004-2006	Chairman, Mathematical Sciences Outreach Committee.
2005-2006	President, UD Chapter of Sigma Xi.
2004-2005	President-elect, UD Chapter of Sigma Xi.
2005	Chairman and Organizing Committee, American Mathematical Society Eastern Section Meeting, University of Delaware.
2002-present	Member, Mathematical Problems in Industry Workshop Organizing Committee
Ongoing	Journal referee, <i>American Journal of Physics</i> , <i>Journal on Computational and Applied Mathematics</i> , <i>Journal of Computational Physics</i> , <i>Journal on Fluid Mechanics</i> , <i>Journal on Non-Newtonian Fluid Mechanics</i> , <i>Physical Review E</i> , <i>SIAM Review</i> , <i>SIAM Journal on Applied Mathematics</i> , <i>Swarm Intelligence</i> , <i>Geophysical & Astrophysical Fluid Dynamics</i> , <i>International Journal for Numerical Methods in Fluids</i> , <i>Transactions on Autonomous and Adaptive Systems</i> , <i>International Journal for Numerical Methods in Fluids</i> .

External funding

- 2020-2021** *Collaborative Research: Expanding the Reach of Industrial Career Training for Graduate Students.*
PI: David Edwards. Co-PI: Louis Rossi
NSF Division of Mathematical Sciences. DMS-2016095.
- 2019-2020** *Collaborative Research: A Two-Week Mentored Program to Prepare Graduate Students for Industrial Careers.*
PI: David Edwards. Co-PI: Louis Rossi
NSF Division of Mathematical Sciences. DMS-1916281.
- 2013-2018** *Collaborative Research: Expanding Links with Industry through Collaborative Research and Education in Applied Mathematics.* PI: Louis Rossi. Co-PI: David Edwards
NSF Division of Mathematical Sciences. DMS-1261592.
- 2012-2013** *Collaborative Research: The MPI Workshop and GSMM Camp.* PI: Louis Rossi. Co-PI: David Edwards
NSF Division of Mathematical Sciences. DMS-1153940.
- 2010-2013** *II-New: System Acquisition for the Development of Scalable Parallel Algorithms for Scientific Computing*
Senior personnel with others.
PI: Stephen F. Siegel. Co-PIs: Douglas M. Swamy, Krzysztof Szalewicz, Peter B. Monk.
NSF Division of Computer and Network Systems. CNS-0958512.
- 2010-2014** Howard Hughes Medical Institute Undergraduate Science Education Grant.
Senior Personnel with others. Co-PIs: Hal White et. al.
- 2009-2011** *NetSE:Small:Autonomous Wireless Swarms: Integrating Science and Engineering.*
PI: Chien-Chung Shen, Co-PI: Louis Rossi. NSF Division of Computer and Communication
Foundations: Network Science and Engineering. CCF-0726556.
- 2009-2012** *Collaborative Research: PetaApps: Enabling Multiscale Modeling of Turbulent Clouds on Petascale Computers.*
PI: Lian-Ping Wang. Co-PIs: Guang Gao, Chandra Kambhampettu, Xiaoming Li and Louis Rossi. NSF Office of CyberInfrastructure: PetaApps. OCI-0904534.
- 2009-2011** *Bio-Inspired Approaches to Secure Scalable Networking*
PI: Chien-Chung Shen, Co-PI: Louis Rossi. Industrial partner: Scalable Technologies.
US Army Small Business Innovative Research Phase I Option/Phase II.
- 2008-2010** *Collaborative Research: Special meeting: The MPI Workshop.* PI: Louis Rossi, Co-PI: Rich Braun
NSF Division of Mathematical Sciences Special Meetings. DMS-0753064.
- 2007-2008** *Bio-Inspired Approaches to Secure Scalable Networking*
PI: Chien-Chung Shen, Co-PI: Louis Rossi. Industrial partner: Scalable Technologies.
US Army Small Business Innovative Research Phase I. A072-074-1669.
- 2007-2010** *Biology Inspired Autonomic Networking Protocols: Analysis and Implementation*
PI: Chien-Chung Shen, Co-PI: Louis Rossi. NSF Computer and Information Science and Engineering:
Emerging Models and Technology program. CCF-0726556.
- 2005-2008** *Collaborative Proposal: Theoretical and Experimental Analysis of Micellar and of Polymer Fluids.*
PI: Pam Cook, Co-PI: Louis Rossi. NSF Mathematical Sciences. DMS-0405931.
- 2006-2010** Howard Hughes Medical Institute Undergraduate Science Education Grant.
Senior Personnel with others. Co-PIs: Hal White et. al. \$1,500,000.
- 2005** NSF Scientific Computing Environments for the Mathematical Sciences.
Research Experience for Undergraduates Supplement.
- 2004-2005** NSF Scientific Computing Environments for the Mathematical Sciences.
PI: Richard Braun, Co-PIs: Tobin Driscoll, Peter Monk and Louis Rossi. NSF DMS-0322583,
- 1999-2003** *Fast, High Order Vortex Methods Based on Deforming Basis Functions.* PI: Louis Rossi.
NSF DMS-9971800.
- 1994-1996** *Investigation of Vortex Monopole and Dipole Interactions.*
NSF Mathematical Sciences Postdoctoral Research Fellowship.

Internal funding (UD only)

- 2013** *Reforming Precalculus and Calculus A: An Integrated Approach*
PI: Louis Rossi. Co-PIs: Jinfa Cai, Bettyann Daley and Georgia Pyrros. Center for Teaching and Learning.
- 2009** *An exploratory study of value added to students' quantitative literacy at the University of Delaware*
PI: Louis Rossi. Co-PIs: Bettyann Daley and Alfinio Flores. Office of Educational Assessment.
- 2007** *Strengthening mathematics instruction with automated algorithmic mastery activities.*
PI: Louis Rossi. Co-PI's: Tobin Driscoll and Russell Luke.
Senior personnel: Profs. Braun, Crissinger, Mwerinde and Seraphin.
University of Delaware Center for Teaching Excellence.
- 2005** *Collaborative Learning Between Food Chemistry and Mathematics.* PIs: Cathy Davies, John Pelesko and Louis Rossi. University of Delaware Center for Teaching Excellence.
- 2004** *Integrated Laboratory Investigations in Math512: Mathematical Modeling.*
PIs: John Pelesko and Louis Rossi. University of Delaware Center for Teaching Excellence.

Peer-reviewed journal publications

- 2020** Nicholas J. Russell and Louis F Rossi. *A Run-and-Tumble Model with Autochemotaxis.*
Bull. Math. Bio. Submitted.
- 2020** K. R. Pilkiewicz et. al. *Decoding Collective communications using Information Theory tools.*
J. Roy. Soc. Interface. 17:20190563
- 2020** Amy Tucker, Delphis F. Levia, Gabriel G. Katul, Kazuki Nanko, Louis F. Rossi.
A network model for stemflow solute transport.
Applied Mathematical Modelling, Volume 88, pp. 266-282. 2020.
- 2016** MJ Mazzoleni, T. Antonelli, KJ Coyne and Louis F. Rossi.
Simulation and Analysis of a model dinoflagellate predator-prey system.
European Physical Journal Special topics, Volume 224, pp 3257-3270. 2016.
- 2014** Jennifer M. Miller, X. Rosalind Wang, Joseph T. Lizier, Mikhail Prokopenko and Louis F. Rossi.
Measuring Information Dynamics in Swarms in Guided Self-Organization: Inception
Emergence, Complexity and Computation, Volume 9, pp 343-364. 2014.
- 2013** C. E. Torres, H. Parishani, O. Ayala, L. F. Rossi and L.-P. Wang.
Analysis and parallel implementation of a forced N-body problem.
Journal of Computational Physics. 245: pp 235-258. 2013.
- 2012** Jennifer M. Miller, Allison Kolpas, Joao Plinio Juchem Neto and Louis F. Rossi,
A Continuum Three-Zone Model for Swarms. Bulletin on Mathematical Biology. 74 (3): pp. 536-561. 2012.
- 2011** Ke Li, Claudio E. Torres, Kyle Thomas, Louis F. Rossi and Chien-Chung Shen
Slime mold inspired routing protocols for wireless sensor networks.
Swarm Intelligence. 5 (3-4): pp. 183-223. 2011.
- 2010** David C. Usher, Tobin A. Driscoll, Prasad Dhurjati, John A. Pelesko, **Louis F. Rossi**,
Gilberto Schleiniger, Kathleen Pusecker, and Harold B. White.
A Transformative Model for Undergraduate Quantitative Biology Education
CBE-Life Sciences Education. 9(3): pp. 181-188. 2010.
- 2010** Claudio E. Torres, **Louis F. Rossi**, Jeremy Keffer, Ke Li and Chien-Chung Shen.
Modeling, analysis and simulation of ant-based network routing protocols. Swarm Intelligence, 4(3): 221-244. 2010.
- 2010** L. A. Barba, and **L. F. Rossi.** *Global field interpolation for particle methods.*
Journal of Computational Physics, 229, pp. 1292-1310.
- 2009** R. B. Platte, **L. F. Rossi** and T. B. Mitchell. *Using global interpolation to evaluate the Biot-Savart integral for deformable elliptical Gaussian vortex elements.* SIAM Journal on Scientific Computing, 31 (2), pp. 2342-2360.
- 2008** T. B. Mitchell and **L. F. Rossi.** *The evolution of Kirchoff elliptic vortices.* Phys. Fluids 20, 054103-1 - 054103-12, May 2008.
- 2007** H. I. Inyang, **L. F. Rossi.**, Graham-Eagle, J. and Pennell, S. *Modeling Smectite Illitization in Earthen Barriers of Buried Radioactive Wastes.* Geomechanics and Geoengineering: An International Journal 2 (2), pp. 87-95.

Peer-reviewed publications (cont'd)

- 2006 **L. F. Rossi.** *Evaluation of the Biot-Savart integral for deformable elliptical Gaussian vortex elements.* SIAM Journal on Scientific Computing 28 (4), pp. 1509-1532.
- 2006 **L. F. Rossi,** Gareth McKinley and L. P. Cook. *Slippage and Migration in Taylor-Couette Flow of a Model for Dilute Wormlike Micellar Solutions.* Journal on Non-Newtonian Fluids 136 (2-3), pp. 79-92.
- 2006 K. Johnson and **L. F. Rossi.** *A mathematical and experimental study of ant foraging trail dynamics.* Journal of Theoretical Biology. 241 (2), pp. 360-399.
- 2006 **L. F. Rossi.** *A Comparative Study of Lagrangian Methods Using Axisymmetric and Deforming Blobs.* SIAM Journal on Scientific Computing 27 (4), pp. 1168-1180.
- 2005 **L. F. Rossi.** *Achieving High-order Convergence Rates with Deforming Basis Functions.* SIAM Journal on Scientific Computing 26 (3), pp. 885-906.
- 2004 L. P. Cook and **L. F. Rossi.** *Shear Layers and Demixing in a Model for Shear Flow of Self-assembling Micellar Solutions.* Journal on Non-Newtonian Fluids, 116, pp. 347-369.
- 2004 **L. F. Rossi,** Hilary Inyang, J. Graham-Eagle and S. Pennell. *A Model of Coupled Heat and Moisture Transport in an Annular Clay Barrier.* American Society of Civil Engineering Journal on Environmental Engineering, 130 (8), pp. 855-862.
- 2002 **L. F. Rossi** and James Graham-Eagle. *On the Existence of Two-dimensional, Localized, Self-similar Vortical Structures.* SIAM Journal on Applied Mathematics, 62 (6), pp. 2114-2128.
- 2002 **L. F. Rossi.** *A High Order Lagrangian Scheme for Flow Through Unsaturated Porous Media* in Contemporary Mathematics 295: Fluid Flow and Transport in Porous Media: Mathematical and Numerical Treatment, pp.433-445.
- 1999 **L. F. Rossi** and G. Sohos. *Interactive Simulation of Contaminant Evolution Through Porous Media.* Future Generation Computer Systems, 15, pp. 477-484.
- 1999 D. Sarocka, A. J. Bernoff and **L. F. Rossi.** *Large-amplitude Interfaces in the Riley-Davis and Sivashinsky Equations for Directional Solidification.* Physica D. 127, pp. 146-176.
- 1998 **L. F. Rossi,** G. Kaiser and D. Washburn. *Recovery of Kolmogorov Statistics in Thermal Mixing in the Troposphere: The Hazards of Real Data.* SPIE Proceedings Vol 3381, pp. 246-255.
- 1997 **L. F. Rossi,** J. F. Lingeitch and A. J. Bernoff. *Quasi-steady Monopole and Tripole Attractors for Relaxing Vortices.* Physics of Fluids, 9 (8), pp. 2329-2338.
- 1997 **L. F. Rossi.** *Merging Computational Elements in Vortex Simulations.* SIAM Journal on Scientific Computing, 18 (4), pp. 1014-1027.
- 1996 **L. F. Rossi.** *Resurrecting Core Spreading Vortex Methods: A Scheme that is both Deterministic and Convergent.* SIAM Journal on Scientific Computing, 17 (2), pp. 370-397.
- 1995 **L. F. Rossi.** *Vortex Computations of Wall Jet Flows.* Proceedings of "A Forum on the Application of Vortex Methods to Engineering Problems," Sandia National Laboratory.
- 1988 **L. F. Rossi.** *Fundamental Properties of a Continuous Dynamic Neural Network.* Interface 12 (2), pp. 31-53.

Peer-reviewed conference papers

- 2013** Marco A. Montes de Oca, Eliseo Ferrante, Alexander Scheidler and Louis F. Rossi.
Binary Consensus via Exponential Smoothing. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering: Volume 126, 2013, pp 244-255. 2013.
- 2013** Y. Sun, L. F. Rossi and C-C. Shen.
Modeling and Analyzing Large Swarms with Covert Leaders 2013 IEEE Sixth International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2013). 9-13 September 2013. Philadelphia PA. Pp. 169-178.
- 2013** J. Kirby, M. Montes de Oca, S. Senger, L. F. Rossi and C-C. Shen.
Tracking Time-Dependent Scalar Fields with Swarms of Mobile Sensors 2013 IEEE Sixth International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2013). 9-13 September 2013. Philadelphia PA. Pp. 159-168.
- 2012** Jennifer Miller, L. F. Rossi, Hao Luan and Chien-Chung Shen.
The Role of Memory in Stabilizing Swarms
2012 IEEE Sixth International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2012), pp. 21-28. Lyon, France. 10-14 September 2012.
- 2012** Rui Fang, Zequn Huang, L. F. Rossi and Chien-Chung Shen.
Analysis of Ant-Based Routing with Wireless Medium Access Control
Swarm Intelligence: Lecture Notes in Computer Science: 7461, pp. 212-219.
- 2012** Josh Kirby, Marco Montes de Oca, Steven Senger, L. F. Rossi and Chien-Chung Shen.
Swarm Interpolation Using an Approximate Chebyshev Distribution
Swarm Intelligence: Lecture Notes in Computer Science: 7461, pp. 324-331.
- 2012** L. F. Rossi. *Using Wikis to Promote Active Inquiry in First Semester Calculus, in Teaching with Technology Volume 2: The Stories Continue.*
<http://ltcessays.wordpress.com/category/essays/>
- 2011** X.R. Wang, J.M. Miller, J.T. Lizier, M. Prokopenko and L.F. Rossi.
Measuring Information Storage and Transfer in Swarms in *Proc. Eleventh European Conference on the Synthesis and Simulation of Living Systems (ECAL 2011)*, Paris, 2011. Published in *Advances in Artificial Life, ECAL 2011*, by Massachusetts Institute of Technology, ISBN 978-0-262-29714-1, 2011, pp. 838-845.
- 2011** Rui Fang, Zequn Huang, Louis F. Rossi, Chien-Chung Shen.
Dynamic Routing Exponent Strategies for Ant-based Protocols.
8th European Workshop on the Application of Nature-inspired Techniques for Telecommunication Networks (EvoCOMNET).
- 2010** Ke Li, Kyle Thomas , Claudio E. Torres, **Louis F. Rossi**, Chien-Chung Shen.
Slime Mold Inspired Path Formation Protocol for Wireless Sensor Networks.
ANTS 2010: Seventh International Conference on Swarm Intelligence.
Brussels, Belgium. 8-10 September 2010. (Acceptance rate: 28%)
- 2010** Jinfa Cai, John A. Pelesko and Louis F. Rossi. "Modeling modeling: Seven habits of mind of effective mathematicians" Educational Interfaces between Mathematics and Industry. Lisbon Portugal.
- 2009** Ke Li, Kyle Thomas , Claudio E. Torres, **Louis F. Rossi**, Chien-Chung Shen.
Naturally Adaptive Protocol for Wireless Sensor Networks Based on Slime Mold.
Third IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO).
San Francisco, September 14-18, 2009. (Poster paper, acceptance rate: 50%).
- 2008** Stephen F. Siegel and **Louis F. Rossi**. *Analyzing BlobFlow: A Case Study Using Model Checking to Verify Parallel Scientific Software.* Lecture Notes in Computer Science: Recent Advances in Parallel Virtual Machine and Message Passing Interface 15th European PVM/MPI Users Group Meeting, Dublin, Ireland, September 7-10, 2008. Proceedings.

Peer-reviewed conference papers (cont'd)

- 2008** Ke Li, Kyle Thomas, **Louis F. Rossi** and Chien-Chung Shen . *Slime-Mold Inspired Protocol for Wireless Sensor Networks*. Second IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO). Venice, Italy, October 20-24, 2008. (Acceptance rate: 27%)
- 2007** **Louis F. Rossi**, Ke Li, Justin Yackoski, Chien-Chung Shen. *Slime mold inspired coordinations for wireless sensor and actor networks* International Conference on Mobile Computing and Networking Proceedings of the First ACM Workshop on Sensor and Actor Networks. Montreal, Quebec, Canada, pp 55 - 56.
- 2007** Xiaofeng Han, **L. F. Rossi**, and Chien-Chung Shen. *Autonomous navigation of wireless robot swarms with covert leadership*. 1st International Conference on Robot Communication and Coordination (ROBOCOMM), Athens, Greece, October 15-17. (Acceptance rate: 49%)

Other publications

- 2016** *Prediction and Optimal Scheduling of Advertisements in Linear Television*. (with Mark J Panaggio et. al.) Proceedings of the Thirty Second Annual Workshop on Mathematical Problems in Industry (2016) arXiv preprint arXiv:1608.07305
- 2014** *Probabilistic modeling of IEEE 802.11 distributed coordination functions*. R Fang, Z Huang, LF Rossi, CC Shen. arXiv preprint arXiv:1411.1126
- 2011** Lian-Ping Wang, Orlando Ayala, Hossein Parishani, Wojciech W Grabowski, Andrzej A Wyszogrodzki, Zbigniew Piotrowski, Guang R Gao, Chandra Kambhamettu, Xiaoming Li, Louis Rossi, Daniel Orozco and Claudio Torres
Towards an integrated multiscale simulation of turbulent clouds on PetaScale computers. *J. Phys.: Conf. Ser.* 318, 072021 doi:10.1088/1742-6596/318/7/072021, Web link: <http://dx.doi.org/10.1088/1742-6596/318/7/072021>.
- 2010** *Mathematical Problems in Industry Workshop Celebrates 25 Years*. Louis F. Rossi. SIAM News, 1 April 2010.
- 2009** *Mathematical models for vulnerable plaques* (with J. Bell et al.) Proceedings of the Twenty-fifth Annual Workshop on Mathematical Problems in Industry (2009).
- 2009** *Characterization of porous filtration media* (with M. Davis et al.) Proceedings of the Twenty-fifth Annual Workshop on Mathematical Problems in Industry (2009).
- 2007** *Simple filtration using porous media* (with S. Altrichter et al.) Proceedings of the Twenty-first Annual Workshop on Mathematical Problems in Industry (2007).
- 2006** *Modeling Mother/Child attachment in stressful situations* (with Lionel Alberti et. al.) Proceedings of the first Fields-MITACS Industrial Problems workshop (2006).
- 2004** *Multi-Phase Flow in a Thin Porous Material* (with Saziye Bayram et. al.) Proceedings of the Eighteenth Annual Workshop on Mathematical Problems in Industry (2004)
- 2002** *Double Flame Systems for Stable Lean-Premixed Combustion* (with M. Booty et. al.) Proceedings of the Eighteenth Annual Workshop on Mathematical Problems in Industry (2002)
- 2001** *Shape Optimization of Pressurized Air Bearings* (with P. Howell et. al.) Proceedings of the Seventeenth Annual Workshop on Mathematical Problems in Industry (2001)
- 2000** *Interaction of Ocean Waves with Wave Generated by Surfing Ship* (with D. Anderson et. al.) Proceedings of the Sixteenth Annual Workshop on Mathematical Problems in Industry (2000)
- 1999** **L. F. Rossi**. *Book Review: Flow at Large Reynolds Numbers: Advances in Fluid Mechanics, vol 11*. H. Schmitt, ed. for Environmental Monitoring and Assessment, 57, pp. 109-112. 1999.

Scientific software

- 2001-present** *BlobFlow*, an open-source, high order vortex method for 2D incompressible flows. <http://www.math.udel.edu/~rossi/BlobFlow>

Recent invited seminars and lectures

- 2018** "Recent Mathematical Insights into Plankton Behavior." Flatiron Institute. Biophysics seminar.
- 2017** "Observation, modeling and computation of algal swimming and photosynthesis." SIAM Annual Meeting 2017.
- 2016** "Achieving high order accuracy with smoothed particle hydrodynamics" (with Z. He) International Conf. on Computational Mathematics and Inverse Problems.
- 2014** "The Mathematics of Swarms and Swarm Intelligence" Temple University. Applied Mathematics and Scientific Computing Seminar.
- 2013** "Modeling and Analyzing Large Swarms." Tennessee State University. Mathematics Colloquium.
- 2011** "Analysis of a three-zone continuum swarm model." Wyss Institute, Harvard University. March 2011.
- 2011** "Analysis of ant-based and slime-based networking protocols." BBN Inc. Cambridge MA. March 2011.
- 2010** "Discovering interdisciplinary research opportunities in Cloud physics, Swarming and Quantitative Biology." Millersville University. 2010.
- 2010** "Naturally Adaptive Protocol for Wireless Sensor Networks Based on Slime Mold." ANTS 2010: Seventh International Conference on Swarm Intelligence.
- 2010** "Understanding convergence of meshless methods: Vortex methods and smoothed particle hydrodynamics." University of Adelaide.
- 2010** "Analysis of Ant-based and Slime-based Network Protocols" Commonwealth Scientific and Industrial Research Organisation (CSIRO) Information and Communications Technology Centre (Australia).
- 2010** "Recent advances in high order viscous vortex methods." Federal University of Rio de Janeiro (Brazil).
- 2009** "A high order vortex method for unsteady incompressible flows." University of California Merced.
- 2008** "Field interpolation via the reverse heat equation" New Jersey Institute of Technology.
- 2007** "Implications of mixing in two-dimensional, coherent vortical structures" Institute for Pure and Applied Mathematics (IMPA), Rio de Janeiro (Brazil).
- 2007** "Field interpolation and other challenges for high order vortex methods" Federal University of Rio de Janeiro.
- 2007** "Reprojection: Mathematical and computational challenges for high order vortex methods" University of Montreal.
- 2005** "The Biot-Savart Integral of Elliptical Gaussian basis functions for high accuracy vortex methods" Duke University.
- 2005** "High performance vortex computations with deforming blobs for 2D incompressible Navier-Stokes." Army Research Laboratory, Aberdeen.
- 2005** "High order vortex methods for the incompressible Navier-Stokes equations" Morgan State University.

Recent conference presentations and symposia

- 2018** "Special Session on The Mathematics of Swimmers and Active Particles"
Organizer: Louis Rossi and Enkeleida Lushi.
2018 AMS Eastern Section Meeting.
- 2018** "Achieving high order accuracy with smoothed particle hydrodynamic methods."
Louis Rossi and Zhenyu He
2018 AMS Eastern Section Meeting.
- 2014** "Dynamics and information transfer in swarms with covert leaders."
2014 AMS Eastern Section Meeting. Special Session on Mathematical Biology.
- 2013** "On the dynamics of large swarms with covert leaders." 2013 AMS Eastern Section Meeting.
Minisymposium on Mathematical Biology.
- 2013** "Using BlobFlow to study the inverse cascade." 2013 AMS Eastern Section Meeting.
Minisymposium on Mesh-free Methods.
- 2012** "Modeling and analyzing large swarms with covert leaders." (Keynote.)
Guided Self-Organization 2012. Sydney Australia.
- 2012** "Deforming particle methods and field interpolation." SIAM Annual Meeting 2012.
Minisymposium on mesh free methods. Driscoll and Rossi organizers.
- 2012** "Using the reverse heat equation to solve the field interpolation problem." SIAM Annual Meeting 2012.
- 2011** "Toward 3D vortex methods with deforming basis functions." (with Claudio C. Torres)
65th Annual Meeting of the American Physical Society Division on Fluid Dynamics, November 2011.
- 2011** "Study of the linear system of equations arisen from interaction of disperse droplets in a turbulent cloud."
(co-authored with Claudio C. Torres)
65th Annual Meeting of the American Physical Society Division on Fluid Dynamics, November 2011.
- 2011** "Analysis of boundary conditions and diffusion schemes for SPH methods."
(co-authored with Zhenyu He)
65th Annual Meeting of the American Physical Society Division on Fluid Dynamics, November 2011.
- 2011** "High Order Three Dimensional Lagrangian Methods Based on Deforming Ellipsoids"
(with Claudio C. Torres)
SIAM Conference on Applications of Dynamical Systems (invited minisymposium) Snowbird, Utah. May 2011.
- 2010** "Recent advances in high order viscous vortex methods."
WONAPDE: Third Chilean Workshop on Analysis of Numerical Methods for Partial Differential Equations.
- 2009** "Modeling Analysis and Simulation of Ant-Based Routing and Forwarding Protocols"
Author: Claudio E. Torres (with Louis Rossi, Chien-Chung Shen, Ke Li, Jeremy Keffer.)
SIAM Annual Meeting.
- 2009** "Using the reverse heat equation to solve field interpolation problems for vortex methods"
SIAM Computational Science and Engineering.
- 2007** "Autonomous Navigation of Wireless Robot Swarms with Covert Leaders"
1st International Conference on Robot Communication and Coordination (ROBOCOMM).
- 2006** "High order Lagrangian computations of elliptical electron vortices."
American Physical Society Division on Fluid Dynamics Annual Meeting.
Regular session and Gallery of Fluid Motion poster.
- 2006** "High order viscous vortex methods with deforming elliptical Gaussians."
American Physical Society Annual Meeting special focus session on "Simulations Using Particles.".
- 2005** "Ant foraging trail dynamics: Modeling, Experiments and Computations"
American Physical Society Division on Fluid Dynamics Annual Meeting.
- 2005** "Computations of wormlike micellar fluids in circular Couette flow."
International Workshop on Numerical Methods for Non-Newtonian Fluids.
- 2005** "Linear to nonlinear: Continuous convergence formulations on Lagrangian schemes for Navier-Stokes."
Midwest Numerical Analysis Conference.
- 2004** "A model for dilute wormlike micellar fluids in circular Couette flow." (with L. P. Cook)
American Physical Society Division on Fluid Dynamics Annual Meeting.

Study Abroad Leadership

Winter 2018 Study abroad co-leader. Mathematics of Sustainable Systems. Melbourne Australia.

Winter 2016 Study abroad co-leader. Mathematics of Sustainable Systems. Melbourne Australia.

Subjects taught since Fall 2004

Undergraduate courses.

Perspectives on Mathematics, Analytic Geometry and Calculus A, Engineering Mathematics I
Engineering Mathematics III, Algorithmic and Numerical Solution of Differential Equations,
Advanced Calculus, Contemporary Applications of Mathematics, Partial Differential Equations

Graduate courses.

Introduction to Applied Mathematics I, Introduction to Applied Mathematics II,
Finite Difference Methods for Partial Differential Equations
Introduction to discretization
Special Topic: Particle Methods