Melvin Leok: Curriculum Vitae

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Education

California Institute of Technology

Ph.D. Control & Dynamical Systems, Applied & Computational Mathematics (minor) Oct 2000–Jun 2004
Thesis: *Foundations of Computational Geometric Mechanics*
Committee: *Jerrold E. Marsden (advisor, deceased), Thomas Y. Hou, Richard M. Murray, Michael Ortiz, and Alan D. Weinstein (Mathematics, UC Berkeley).*

M.S. Mathematics Oct 1999–Jun 2000

B.S. Mathematics (*with honor*) Oct 1996–Jun 2000

Professional Experience

Co-Director, CSME graduate program, University of California, San Diego. Nov 2020–present
Professor (Tenured), Mathematics, University of California, San Diego. Jul 2013–present
Associate Professor (Tenured), Mathematics, University of California, San Diego. Jul 2009–Jun 2013
Visiting Assistant Professor, Control & Dynamical Systems, California Institute of Technology. Apr–Jun 2009
Assistant Professor (Tenure-Track), Mathematics, Purdue University. Aug 2006–May 2009
T.H. Hildebrandt Research Assistant Professor, Mathematics, University of Michigan. Sep 2004–Aug 2006
Postdoctoral Scholar, Control & Dynamical Systems, California Institute of Technology. Jul–Aug 2004

Research Interests

Computational geometric mechanics, computational geometric control theory, geometric numerical integration, discrete differential geometry, numerical analysis.

Research Prizes and Honors

George W. and Carol A. Lattimer Faculty Research Fellowship, School of Physical Sciences, UC San Diego. 2024
Simons Fellowship in Mathematics, Simons Foundation. 2022
Newton Award for Transformative Ideas, Department of Defense. 2020
Kavli Frontiers of Science Fellow, National Academy of Sciences. 2012, 2014, 2016
Faculty Early Career Development (CAREER) Award, Applied Mathematics, National Science Foundation. 2008
SciCADE New Talent Prize, International Conference on Scientific Computation and Differential Equations. 2007
SIAM Student Paper Prize, Society for Industrial and Applied Mathematics. 2003
Leslie Fox Prize in Numerical Analysis (second prize), Institute of Mathematics and its Applications, UK. 2003

Selected Invited Addresses

Marsden Memorial Lecture, PIMS Distinguished Lecture, UNBC, Canada. Mar 2023
Keynote, Meeting of the Society for Natural Philosophy, Chicago, IL. Sep 2019
Plenary, Foundations of Computational Mathematics, Barcelona, Spain. Jul 2017
Plenary, NUMDIFF-14, Martin-Luther-Universität Halle-Wittenberg, Halle, Germany. Sep 2015
Plenary, IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control, Lyon, France. Jul 2015

Research Funding

(Total of $2,242,004 in single PI awards, $1,502,184 share out of $4,592,583 in joint awards)

Applied Materials Sponsored Research Award, $170,000, single PI. 2023–2024
NSF Applied Mathematics Grant, DMS-2307801, $360,935, single PI. 2023–2026
AFOSR Dynamics & Control Grant, FA9550-23-1-0279, $700,000, PI ($325,000 share, co-PI: J. Burby). 2023–2026
Qualcomm Technologies Research Gift, $100,000, single PI. 2022
Simons Fellowship in Mathematics, $132,000, single PI. 2022–2023
DOD Newton Award for Transformative Ideas, $48,344, single PI. 2020
SPAWAR: Intelligent Diagnostics of V-22 Osprey, $1,000,000, co-PI ($333,333 share, PI: R. Gupta). 2019–2020
NSF Applied Mathematics Grant, DMS-1813635, $237,632, single PI. 2018–2021
AFOSR Dynamics & Control Grant, FA9550-18-1-0288, $600,000, co-PI ($282,132 share, PI: T. Lee). 2018–2021
NSF Research Training Group Grant, DMS-1345013, $1,837,678, co-PI ($367,535 share, PI: R.E. Bank). 2014–2019
NSF Applied Mathematics Grant, DMS-1411792 $140,785, single PI. 2014–2019
NSF Dynamical Systems Grant, CMMI-1334759. $194,876, single PI. 2013–2017
NSF Focused Research Group Grant, DMS-1065972. $454,905, co-PI ($194,184 share, PI: M.J. Holst). 2011–2015
NSF Dynamical Systems Grant, CMMI-1029445. $111,134, single PI. 2010–2014
NSF CAREER Award (Applied Math), DMS-1010687 (formerly DMS-0747659). $455,188, single PI. 2008–2015

Research Funding (Continued)

NSF Computational Mathematics Grant, DMS-1001521 (formerly DMS-0714223). $163,743, single PI. 2007–2011
NSF Applied Mathematics Grant, DMS-0726263 (formerly DMS-0504747). $108,067, single PI. 2005–2009
Margaret and Herman Sokol Spring/Summer Research Grant, University of Michigan. $4,000, single PI. 2006
Horace H. Rackham Faculty Fellowship, University of Michigan. $7,000, single PI. 2005
Horace H. Rackham Faculty Grant, University of Michigan. $7,300, single PI. 2004–2005
Grant-in-Aid of Research, Sigma Xi, The Scientific Research Society. $1,000, single PI. 2001

Graduate Fellowships

Josephine de Kármán Fellowship (established by Theodore von Kármán). 2003–2004
International Fellowship, Agency for Science, Technology and Research, Singapore. 2002–2004
Poincaré Fellowship (Betty and Gordon Moore Fellowship), Caltech. 2000–2004
Tau Beta Pi Fellowship, Tau Beta Pi, National Engineering Honor Society. 2000–2001
Tan Kah Kee Foundation Postgraduate Scholarship, Singapore. 2000

Selected Honors and Awards

Herbert J. Ryser Scholarship, Caltech Mathematics Department. 1999
E. T. Bell Undergraduate Mathematics Research Prize, Caltech Mathematics Department. 1999
Jack E. Froehlich Memorial Award, Caltech. 1999
Sigma Xi, The Scientific Research Society (Associate Member / Full Member). 1999, 2005
Tau Beta Pi, National Engineering Honor Society. 1999
Upperclass Merit Award (Carnation Scholarship), Caltech. 1998, 1999
Loke Cheng-Kim Foundation Scholarship, Singapore. 1996–2000
Lee Kuan Yew Award for Mathematics and Science, Ministry of Education, Singapore. 1994
Top Prize, *First Step to Nobel Prize in Physics*, Polish Academy of Sciences. 1993
Student of the Year, Computer Science Faculty, Raffles Junior College, Singapore. 1993
Bronze medal, *4th International Olympiad in Informatics*, Bonn, Germany. 1992

Invited Conference Talks

Structured Machine Learning and Time–Stepping for Dynamical Systems, BIRS, Banff, Canada. Feb 2024
Keynote, International Conference on Highly Flexible Slender Structures, Rijeka, Croatia Sep 2023
Symmetry, Invariants, and their Applications (Peter Olver's 70th Birthday), Halifax, Canada Aug 2022
Geometric Numerical Integration Workshop, Oberwolfach, Germany. Mar 2021
Structure-Preserving Geometric Discretization of Physical Systems, Princeton University, NJ. Feb 2020
The Future of Structure-Preserving Algorithms, ICMS Edinburgh, UK. Oct 2019
Structure Preservation and General Relativity, Newton Institute, Cambridge, UK. Sep 2019
Geometric Numerical Integration of Differential Equations, Beijing, China. Sep 2019
Computational Challenges in Gravitational Wave Astronomy, IPAM, Los Angeles, CA. Jan 2019
Hamiltonian Systems, from Topology to Applications through Analysis I, MSRI, Berkeley, CA. Oct 2018
RobertFest (in honor of Robert Littlejohn), Berkeley, CA. Aug 2018
Geometric Mechanics and Control, Beijing, China. Jul 2018
Numerical Analysis of Complex PDE Models, Erwin Schrödinger Institute, Vienna, Austria. Jun 2018
Nonlinear Data: Theory and Algorithms, Oberwolfach, Germany. Apr 2018
Workshop on General Relativity and Finite Element Exterior Calculus, UC San Diego, La Jolla, CA. Jan 2018
Dynamical Systems and Geometric Mechanics (in honor of Juergen Scheurle), Munich, Germany. Jun 2017
Geometric Algorithms and Methods for Plasma Physics Workshop, MPI Munich, Germany. Sep 2016
Mathematics of Shapes and Applications, Institute of Mathematical Sciences, Singapore. Jul 2016
Discretization in Geometry and Dynamics, Lake Ammersee, Germany. Oct 2015
NSF Workshop on Learning, Perception and Control in Robots and Humans, Washington D.C. Aug 2015
First Joint STAMP-GMC Meeting, Madrid, Spain. Jun 2015
Integrability in Mechanics and Geometry: Theory and Computations, ICERM, Providence, RI. Jun 2015
Advanced Numerical Methods in the Mathematical Sciences, Texas A&M, College Station, TX. May 2015
Semi-Plenary, Geometric integration and computational mechanics, FoCM, Montevideo, Uruguay. Dec 2014
Control and Dynamical Systems at 20, California Institute of Technology, Pasadena, CA. Aug 2014
Conference on Numerical Analysis and Scientific Computing, Max-Planck Institute, Leipzig, Germany. Jan 2014
Discrete Curvature, CIRM, Luminy, France. Nov 2013
Modern Applications of Homology and Cohomology, IMA, Minneapolis, MN. Oct 2013

Invited Conference Talks (Continued)

Topics in Numerical Analysis for Differential Equations, ICMAT, Madrid, Spain.	Jul 2013
IRSES Meeting on Differential Geometry and Mechanics, Ghent, Belgium.	Jan 2013
Structured Matrix Computations in Non-Euclidean Geometries: Algorithms and Applications, CIRM.	Oct 2012
Geometry, Symmetry, Dynamics, and Control: The Legacy of Jerry Marsden, Fields Institute, Toronto.	Jul 2012
Applied Dynamics and Geometric Mechanics Workshop, Oberwolfach, Germany.	Aug 2011
Rough Paths and Combinatorics in Control Theory, UCSD, La Jolla, CA.	Jul 2011
Computational Methods in Dynamics, ICTP, Trieste, Italy.	Jul 2011
KAM Theory and Geometric Integration Workshop, BIRS, Banff, Canada.	Jun 2011
Seventh Annual Structured Integrators Workshop, Caltech, Pasadena, CA.	May 2011
Geometric Numerical Integration Workshop, Oberwolfach, Germany.	Mar 2011
New Geometric and Numeric Tools for the Analysis of Differential Equations, BIRS, Canada.	Aug 2010
Sixth Annual Structured Integrators Workshop, University of California, San Diego, CA.	Apr 2010
XVIII International Fall Workshop on Geometry and Physics, Benasque, Spain.	Sep 2009
Fifth Annual Structured Integrators Workshop, Caltech, Pasadena, CA.	May 2009
Fourth Annual Structured Integrators Workshop, Stanford, CA.	Apr 2008
Geometric Mechanics Workshop, BIRS, Banff, Canada.	Aug 2007
Discrete Differential Geometry, Berlin, Germany.	Jul 2007
New Talent Plenary Lecture, SciCADE, Saint Malo, France.	Jul 2007
Effective Computational Methods for Highly Oscillatory Problems, Newton Institute, Cambridge, UK.	Jul 2007
International Summer School on Geometry, Mechanics, and Control (7 hours), Castro Urdiales, Spain.	Jun 2007
Turbulence Working Group Workshop, T-7, LANL, Santa Fe, NM.	Dec 2003
Full Body Problem Workshop, Caltech, Pasadena, CA.	Nov 2003
Leslie Fox Prize Meeting, University of Cambridge, UK.	Jun 2003
Student Paper Prize Presentation, SIAM Annual Meeting, Montréal, Canada.	Jun 2003
Geometrical Mechanics and Turbulence Modeling, CNLS, LANL, Santa Fe, NM.	Nov 2002
Geometry, Symmetry and Mechanics II, University of Warwick, UK.	Jul 2002
Invariant and Symmetry-Preserving Integrators for N-Body Simulation, University of Leicester, UK.	Apr 2002
Reduced Dimensional Modeling Workshop, CNLS, LANL, Los Alamos, NM.	Nov 2001

Invited Colloquia

Mathematics Colloquium, Georgia Institute of Technology, Atlanta, GA.	Mar 2020
Computational and Applied Mathematics Colloquium, University of Chicago, IL.	Apr 2019
Mathematics Colloquium, Nanyang Technological University, Singapore.	Dec 2018
Mathematics Colloquium, Technical University of Munich, Germany.	Dec 2016
Mathematics Colloquium, Nanyang Technological University, Singapore.	Sep 2016
Mathematics Colloquium, National University of Singapore, Singapore.	Aug 2016
Mathematics Colloquium, University of Arizona, Tucson, AZ.	Sep 2015
Mathematics Colloquium, Dartmouth College, Hannover, NH.	Feb 2015
Mathematics Colloquium, University of Texas, Dallas, TX.	Jan 2015
Mathematics Colloquium, Louisiana State University, Baton Rouge, LA.	May 2014
Computational Science Colloquium, San Diego State University, San Diego, CA.	Jan 2014
Mathematics Colloquium, Johann Bernoulli Institute, University of Groningen, Netherlands.	Sep 2013
Center for Applied Mathematics Colloquium, Cornell University, Ithaca, NY.	Feb 2012
Mathematics Colloquium (Oliver Club), Cornell University, Ithaca, NY.	Feb 2012
Mathematics Colloquium, Penn State University, State College, PA.	Nov 2011
Colloquium, Engineering Science and Applied Mathematics, Northwestern University, Evanston, IL.	Oct 2011
Colloquium, Mathematics, Statistics, and Computer Science, University of Illinois, Chicago, IL.	Apr 2011
Colloquium, School of Mathematical and Statistical Sciences, Arizona State University, Tempe, AZ.	Oct 2009
Computational and Applied Mathematics Colloquium, Penn State University, State College, PA.	Oct 2009
Mathematics Special Colloquium, University of Minnesota, MN.	Dec 2008
Mathematics Special Colloquium, University of California, San Diego, CA.	Nov 2008
Center for Applied Mathematics Colloquium, University of Notre Dame, Notre Dame, IN.	Nov 2008
Center for Applied Mathematics Colloquium, University of Notre Dame, Notre Dame, IN.	Apr 2007
Mathematics Colloquium, University of Iowa, Iowa City, IA.	Mar 2007
Applied Mathematics Colloquium, University of Maryland, Baltimore County, MD.	Nov 2006

Invited Colloquia (Continued)

Mathematical Sciences Colloquium, Rensselaer Polytechnic Institute, Troy, NY.	Oct 2006
Mathematics Colloquium, Colorado School of Mines, CO.	Feb 2006
Mathematics Colloquium, University of South Carolina, SC.	Feb 2006
Mathematics Colloquium, Texas A&M University, College Station, TX.	Feb 2006
Mathematics Colloquium, Colorado State University, Fort Collins, CO.	Feb 2006
Mathematics Special Colloquium, Purdue University, West Lafayette, IN.	Feb 2006
Mathematics Colloquium, University of California, San Diego, CA.	Dec 2004

Invited Seminar Talks

Computational and Applied Mathematics Forum, SIAM Central States Section.	Dec 2023
Control and Optimization Seminar, Louisiana State University, Baton Rouge, LA.	Oct 2023
Control, Dynamical Systems, Computation Seminar, University of California, Santa Barbara, CA.	Oct 2023
Mechanical and Aerospace Engineering Seminar, University of California, Irvine, CA.	May 2023
Applied Mathematics Seminar, University of Hawai'i, Mānoa, HI.	May 2023
CCAM Lunch Seminar, Purdue University, West Lafayette, IN.	Oct 2022
TILOS Seminar, University of California, San Diego, CA.	Mar 2022
Scientific Computing and Numerics Seminar, Cornell University, Ithaca, NY.	Nov 2021
Applied and Computational Mathematics Seminar, University of Wisconsin, Madison, WI.	Mar 2021
Information Geometry Seminar, Applied Mathematics and Statistics, Stony Brook University, NY.	Oct 2020
Numerical Analysis, Center for Computational Mathematics, Flatiron Institute, New York, NY.	Nov 2019
Applied Mathematics Seminar, McGill University, Montreal, Canada.	Nov 2019
Applied Mathematics Seminar, University of California, Riverside, CA.	Oct 2019
Applied Mathematics Seminar, University of Warwick, Coventry, UK.	Oct 2019
Geometry, Compatibility and Structure-Preservation Seminar, Newton Institute, Cambridge, UK.	Jul 2019
Geometric Mechanics Seminar, Imperial College, London, UK.	Jul 2019
Control Seminar, University of Cambridge, Cambridge, UK.	Jul 2019
Control Seminar, University of Oxford, Oxford, UK.	Jul 2019
Applied and Computational Mathematics Seminar ($\times 2$), National University of Singapore, Singapore.	Dec 2018
Lunch with Hamilton Seminar, MSRI, Berkeley, CA.	Sep 2018
Applied Mathematics Seminar, Stanford University, Palo Alto, CA.	Sep 2018
Institute of Computational Mathematics Seminar, Chinese Academy of Sciences, Beijing, China.	Jul 2018
MS2Discovery Seminar, Wilfrid Laurier University, Waterloo, Canada.	Sep 2017
Applied Mathematics Seminar, University of California, Irvine, CA.	May 2017
Special Seminar, North Carolina State University, Raleigh, NC.	Jan 2017
Applied Mathematics Seminar, University of Wisconsin, Madison, WI.	Oct 2015
Modeling and Computation Seminar, University of Arizona, Tucson, AZ.	Sep 2015
Scientific Computing Seminar, Brown University, Providence, RI.	Jun 2015
Mathematics Seminar, Rutgers University, Camden, NJ.	Apr 2015
Center for Control, Dynamical Systems and Computations Seminar, UC Santa Barbara, CA.	Nov 2014
Special Seminar, Rutgers University, Piscataway, NJ.	Feb 2013
PIMS Seminar, University of British Columbia, Vancouver, Canada.	Aug 2010
Informal Numerical Analysis Seminar, Rutgers University, Piscataway, NJ.	May 2010
Applied Mathematics Seminar, California State University, Northridge, CA.	Apr 2010
Center for Computational Mathematics Seminar, University of California, San Diego, CA.	Apr 2010
Cymer Center for Control Systems and Dynamics Seminar, University of California, San Diego, CA.	Apr 2010
Mechanics and Control Seminar, Beijing Institute of Technology, Beijing, China.	May 2009
Applied Mathematics Seminar, Stanford University, Palo Alto, CA.	May 2009
Applied Mathematics and Statistics Seminar, Johns Hopkins University, Baltimore, MD.	Feb 2009
Physical Mathematics Seminar, Massachusetts Institute of Technology, Cambridge, MA.	Feb 2009
Applied Mathematics Seminar, Texas A&M University, College Station, TX.	Dec 2008
Control and Dynamical Systems Seminar, Caltech, Pasadena, CA.	Nov 2008
Applied and Interdisciplinary Mathematics Seminar, University of Michigan, Ann Arbor, MI.	Nov 2008
Dynamics Seminar, Department of Mathematics, Cornell University, NY.	Oct 2008
Scientific Computing Seminar, Department of Mathematics, Tsinghua University, Beijing, China.	Jun 2008
Institute of Computational Mathematics Seminar, Chinese Academy of Sciences, Beijing, China.	Jun 2008
Applied and Computational Mathematics Seminar, University of Auckland, New Zealand.	Dec 2007

Invited Seminar Talks (Continued)

Applied Mathematics and PDE Seminar, University of Wisconsin, Madison, WI.	Oct 2007
Applied Mathematics Seminar, Imperial College, London, UK.	May 2007
Highly Oscillatory Problems Seminar, Newton Institute, University of Cambridge, UK.	May 2007
CDS/CIMMS Lunchtime Seminar, Caltech, Pasadena, CA.	Dec 2006
Geometry and Dynamical Systems with Applications Seminar, Arizona State University, Tempe, AZ.	Apr 2006
Dynamics Seminar, University of Colorado, Boulder, CO.	Feb 2006
Applied and Interdisciplinary Mathematics Seminar, University of Michigan, Ann Arbor, MI.	Feb 2006
Numerical Analysis and Differential Equations Seminar, North Carolina State University, Raleigh, NC.	Jan 2006
Applied Mathematics Seminar, Mathematics, University of Waterloo, Canada.	Dec 2005
Control Seminar, College of Engineering, University of Michigan, Ann Arbor, MI.	Oct 2005
Differential Geometry and Analysis Seminar, University of Toledo, Toledo, OH.	Sep 2005
Computer and Computational Sciences, CCS-2, LANL, Los Alamos, NM.	Aug 2005
Special Seminar, Mathematics, University of California, Berkeley, CA.	Apr 2005
Mathematical Physics Seminar, University of Minnesota, Twin Cities, MN.	Mar 2005
Numerical Analysis and Differential Equations Seminar, North Carolina State University, Raleigh, NC.	Jan 2005
Flight Dynamics and Control Seminar, Aeronautics, University of Michigan, Ann Arbor, MI.	Oct 2004
Geometry Seminar, University of Michigan, Ann Arbor, MI. (2 talks)	Oct 2004
Applied Mathematics Seminar, University of California, San Diego, CA.	Aug 2004
Temasek Laboratories, National University of Singapore.	Jul 2004
Mathematics Department, National University of Singapore. (4 talks)	Jul 2004
Institute for High Performance Computing, National University of Singapore.	Jul 2004
SIAM Student Chapter, Caltech, Pasadena, CA.	Jan 2004
Applied Math and Numerical Analysis Seminar, University of Minnesota, Twin Cities, MN.	Jan 2004
School of Engineering and Science, International University of Bremen, Germany.	Sep 2003
Paderborn Institute for Scientific Computation, University of Paderborn, Germany.	Sep 2003
Caltech/JPL Nonlinear Astrodynamics Group, Pasadena, CA.	Aug 2003
Institute for High Performance Computing, National University of Singapore.	Feb 2003
Center for Integrative Multiscale Modeling and Simulation, Caltech, Pasadena, CA.	May 2002
Culham Electromagnetics and Lightning Ltd, Abingdon, Oxfordshire, UK.	Apr 2002
Department of Informatics, University of Bergen, Bergen, Norway.	Oct 2001
Department of Mathematical Sciences, NTNU, Trondheim, Norway.	Oct 2001
Mathematics Department, National University of Singapore.	Aug 2000
Center for Remote Imaging, Sensing and Processing, National University of Singapore.	Sep 1999

Invited Minisymposium Talks

Geometric and stochastic methods in mechanics and control, Nonlinear Theory and Its Applications.	Dec 2022
Conservative and Geometric Discretizations, CAIMS Annual Meeting.	Jun 2022
Information Geometry and Applications, Statistical Society of Canada Annual Meeting.	Jun 2022
Geometric Methods with Applications to Mechanics and Control, SIAM Dynamical Systems.	May 2021
Geometric Mechanics and Robotics, SIAM Dynamical Systems, Snowbird, UT.	May 2019
Geometric Approaches to Mechanics and Control, AMS Sectional Meeting, Honolulu, HI.	Mar 2019
Numerical Methods for Partial Differential Equations, AMS Sectional Meeting, Honolulu, HI.	Mar 2019
Geometric Mechanics, AMS Fall Central Sectional Meeting, Ann Arbor, MI.	Oct 2018
Variational Principles in Mechanics, SIAM Dynamical Systems, Snowbird, UT.	May 2017
Geometric Methods in Mechanics and Control with Applications, CMS Summer, Edmonton, Canada.	Jun 2016
Advances for Numerical Methods in Linear and Non-linear Dynamics, USNCCM, San Diego, CA.	Jul 2015
Geometric Mechanics and Applications, SIAM Dynamical Systems, Snowbird, UT.	May 2015
Geometries Defined by Differential Forms, Joint Mathematics Meetings, San Antonio, TX.	Jan 2015
Structure-Preserving Discretization of Dynamical Systems, MTNS, Groningen, Netherlands.	Jul 2014
Geometric Mechanics, AIMS Conference on Dynamical Systems, Madrid, Spain.	Jul 2014
Geometry and Topology in Control, Allerton Conference, Monticello, IL.	Oct 2013
Variational Techniques in Structure-Preserving Methods for PDEs, SciCADE, Valladolid, Spain.	Sep 2013
Smooth and Discrete Geometrical Approaches to Control, SIAM Controls, San Diego, CA.	Jul 2013
Linear Algebra, Control, and Optimization, International Linear Algebra Society, Providence, RI.	Jun 2013
Variational Principles, SIAM Dynamical Systems, Snowbird, UT.	May 2013

Invited Minisymposium Talks (Continued)

Geometric Methods in Mechanical and Dynamical Systems, AMS Section Meeting, Tucson, AZ. Oct 2012
Exploiting Geometry in the Development of Numerical Methods of PDEs, SIAM PDEs, San Diego, CA. Nov 2011
Marsden Memorial, ICIAM, Vancouver, Canada. Jul 2011
Symmetry in Variational Problems, SIAM Dynamical Systems, Snowbird, UT. May 2011
Geometric Control on Nonlinear Manifolds, IEEE CDC, Atlanta, GA. Dec 2010
Nonlinear Dynamics and Control, CAIMS Annual Meeting, St. John's, Newfoundland, Canada. Jul 2010
Computational Methods for Dynamical Systems Analysis, USNCTAM, State College, PA. Jun 2010
Applications to Computational Mechanics, SciCADE, Beijing, China. May 2009
Geometric Mechanics and its Applications, SIAM Dynamical Systems, Snowbird, UT. May 2009
Geometric Mechanics, Control, and Integrability, AMS Southeastern Sectional Meeting, Huntsville, AL. Oct 2008
Advances in Time-Integration, World Congress on Computational Mechanics, Venice, Italy. Jul 2008
Geometric Integration and Computational Mechanics, FoCM, City University of Hong Kong. Jun 2008
Geometric Numerical Integration, Joint Meeting of the AMS - NZMS, Wellington, New Zealand. Dec 2007
Geometric and Symplectic Integration, SciCADE, Saint-Malo, France. Jul 2007
Geometric Methods in Dynamical Systems, SIAM Dynamical Systems, Snowbird, UT. May 2007
Applications of the Geometric Phase in Classical Mechanics, SIAM Annual Meeting, Boston, MA. Jul 2006
Contemporary Dynamical Systems, AMS Annual Meeting, San Antonio, TX. Jan 2006
Geometric Dynamics and its Applications, SIAM Dynamical Systems, Snowbird, UT. May 2005
Geometric Dynamics, AIMS Dynamical Systems and Differential Equations, Pomona, CA. Jun 2004
Geometric Methods for PDEs, NUMDIFF, University of Halle, Germany. Sep 2003
Non-Grid based Methods for Geophysical and Astrophysical Flows, ICIAM, Sydney, Australia. Jul 2003
Structure-Preserving Algorithms, SciCADE, Trondheim, Norway. Jul 2003
Discrete Geometry and Geometric Integration, SIAM Dynamical Systems, Snowbird, UT. May 2003
Geometric Integration and Computational Dynamics, FoCM, Minneapolis, MN. Aug 2002
Geometric Integration, SIAM Dynamical Systems, Snowbird, UT. *SIAM Student Travel Award.* May 2001

Contributed Talks

Groupoidfest, University of California, Riverside, CA. Nov 2008
MSRI Workshop on Application of Topology in Science and Engineering, Berkeley, CA. Sep 2006
Geometric Numerical Integration Workshop, Oberwolfach, Germany. Mar 2006
Frontiers of Applied Analysis, Pittsburgh, PA. Sep 2005
IPAM Relativistic Astrophysics Workshop, Los Angeles, CA. May 2005
Southern California Applied Mathematics Symposium, Claremont, CA. Apr 2004
Auckland Numerical Ordinary Differential Equations, Auckland, New Zealand. Jul 2003
International Congress on Industrial and Applied Mathematics, Sydney, Australia. Jul 2003
Biennial Conference on Numerical Analysis, Dundee, Scotland. Jun 2003
Mechanics and Symmetry European Summer School, Peyresq, France. Sep 2001
Southwest Regional Workshop on New Directions in Dynamical Systems, USC, Los Angeles, CA. Nov 2000
Caltech SURF Seminar Day, Pasadena, CA. Oct 1999
Caltech SURF Seminar Day, Pasadena, CA. *Semi-finalist, Perpall Speaking Competition.* Oct 1998

Contributed Posters

Advanced Computational Electromagnetics Workshop, Boston, MA. May 2006
New Paradigms in Computation, IMA Tutorial/Workshop, Minneapolis, MN. Mar 2005
Compatible Spatial Discretizations for Partial Differential Equations, IMA, Minneapolis, MN. May 2004
ARO-Institute for Collaborative Biotechnologies Review, UCSB, Santa Barbara, CA. Jul 2003, Feb 2004
International Congress on Industrial and Applied Mathematics, Sydney, Australia. Jul 2003
CIMMS-IPAM Workshop on Molecular Modeling and Computation, Pasadena, CA. Nov 2002
DARPA/NSF OPAAL Workshop, Seattle, WA. May 2001
Southern California Applied Mathematics Symposium, Caltech, Pasadena, CA. May 2001
Dynamics Days 2000, Santa Fe, NM. Jan 2000
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT. May 1999, 2003
NSF-KDI/IGPP Workshop on accurate simulation and modeling of physical systems, San Diego, CA. *Student Poster Silver Medal Award in 1998.* Nov 1998, 1999, 2000

Research Visits, Conferences and Summer Schools

Visiting Scholar, Geometry, compatibility and structure preservation in computational differential equations, Newton Institute, University of Cambridge, UK.[‡,♯]	Jul, Oct 2019
Research Member, Hamiltonian systems, MSRI, Berkeley, CA.[♯]	Aug–Oct 2018
New Trends in Applied Geometric Mechanics, ICMAT, Madrid, Spain.[♯]	Jul 2017
Mathematics of Shapes and Applications, Institute for Mathematical Sciences, National University of Singapore.[♯]	Jul 2016
Geometric Numerical Integration Workshop, Oberwolfach, Germany.	Mar 2016
Johann Bernoulli Institute for Mathematics and Computer Science, Groningen, Netherlands.[♯]	Sep 2013
Seminar for Applied Mathematics, ETH Zürich, Switzerland. Host: Prof. Philipp Grohs.[♯]	Aug 2013
Weinstein Symposium, Institute Henri Poincaré, Paris, France.[‡]	Jul 2013
Workshop on Reduced-Order Modeling in General Relativity, Caltech, Pasadena, CA.[‡]	Jun 2013
Geometric and Topological Methods in Control and Robotics, Madrid, Spain.[†,‡]	Oct 2010
Geometry, Mechanics, and Dynamics, CIRM, France.[‡]	Jul 2010
HarrisFest, University of Michigan, Ann Arbor, MI. [‡]	May 2010
Groupoidfest, University of California, Riverside, CA.[‡]	Nov 2008
Laboratory of Scientific and Engineering Computing, Institute of Computational Mathematics, Chinese Academy of Sciences, Beijing, China. Host: Prof. Jialin Hong.[‡,♯]	Jun 2008
Visiting Fellow, Highly Oscillatory Problems: Computation, Theory and Application, Newton Institute, University of Cambridge, UK.[†,‡]	May 2007
Geometry of Mechanism Science, Notre Dame, IN.[†]	Mar 2007
IMA Tutorial: Algebraic Geometric Methods in Engineering, Minneapolis, MN.[†]	Sep 2006
International Congress of Mathematicians, Madrid, Spain.[‡]	Aug 2006
Multiscale Modeling and Computation - Basic Theory and the Geosciences, Caltech, Pasadena, CA.[†]	Nov 2005
IPAM Bridging Time and Length Scales in Materials Science and Bio-Physics, Multiscale Analysis and Computation, Los Angeles, CA.[†]	Nov 2005
IMA New Directions Short Course: Quantum Computation, Minneapolis, MN.[†]	Aug 2005
International Forum on Multiscale Methods and Partial Differential Equations, Los Angeles, CA.[†]	Aug 2005
Quantum Control Summer School, Caltech, Pasadena, CA.[†]	Aug 2005
IPAM Grand Challenge Problems in Computational Astrophysics, Los Angeles, CA. Relativistic Astrophysics.[†]	May 2005
N-Body Problems in Astrophysics.[†]	Apr 2005
Department of Mathematics, National University of Singapore, Singapore.[‡,♯]	Jul 2004
CNA Summer School, Advances in Nonlinear Analysis, Center for Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, PA.[†]	May–Jun 2004
DARPA Workshop on Design of Robust Dynamical Systems, UTRC, East Hartford, CT.[†]	Jan 2004
Advances and Mathematical Issues in Large Scale Simulation, Institute for Mathematical Sciences, National University of Singapore.[‡]	Feb 2003
Mathematical Challenges in Scientific and Engineering Computation, Newton Institute, University of Cambridge.[‡]	Jan 2003
Workshop on Geometry, Dynamics, and Mechanics, Fields Institute, Toronto, Canada.[†]	Aug 2002
Workshop on Astrodynamics, University of Surrey.[†]	Apr 2002
Workshop on Classical N-Body Systems and Applications, University of Warwick.[†]	Apr 2002
LMS/EPSRC Short Course on Computational Differential Equations.[†]	Mar 2002
Groupoidfest, University of California, Berkeley, CA.[‡]	Nov 2001
Department of Informatics, University of Bergen, Bergen, Norway. Host: Prof. Hans Munthe-Kaas.[♯]	Oct 2001
Department of Mathematical Sciences, Norwegian University of Science and Technology, Trondheim, Norway. Host: Prof. Brynjulf Owren.[♯]	Oct 2001
Numerical Analysis Group, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, United Kingdom. Host: Prof. Arieh Iserles.[‡]	Aug–Sep 2001
Surface Water Waves, Newton Institute EuroConference, University of Cambridge.[†]	Aug 2001
5th PIMS Industrial Problem Solving Workshop, University of Washington, Seattle, WA.[†]	Jun 2001
4th PIMS Graduate Mathematics Modelling Camp, University of Victoria, BC, Canada.[†]	Jun 2001
CNA Summer School, Multiscale Problems in Nonlinear Analysis, Center for Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, PA.[†]	Jun 2001

[†] *Funded by conference organizers.* [‡] *Funded by research grants.* [♯] *Funded by host institution.*

Postdoctoral Scholars Advised

Panchali Nag, S.E.W. Visiting Assistant Professor, University of California, San Diego, 2022–2025.

Evan Gawlik, NSF Postdoc/RTG Postdoc/Teaching Visitor, University of California, San Diego, 2015–2018.
NSF Mathematical Sciences Postdoctoral Research Fellow, 2017–2019; 2nd prize, Leslie Fox Prize in Numerical Analysis, 2017; tenure-track Assistant Professor of Mathematics, University of Hawaii, 2018 onwards.

James Hall, Postdoctoral Scholar/Teaching Visitor, University of California, San Diego, 2013–2014.
Currently a Research Scientist at Microsoft.

Joris Vankerschaver, Postdoctoral Scholar/Teaching Visitor, University of California, San Diego, 2010–2012.
Currently an Associate Professor at Ghent University Global Campus, Korea.

Tomoki Ohsawa, Postdoctoral Scholar/Teaching Visitor, University of California, San Diego, 2010–2012.
Currently an Associate Professor of Mathematics at University of Texas, Dallas.

Tatiana Shingel, Postdoctoral Scholar/Teaching Visitor, University of California, San Diego, 2009–2012.
Currently a Data Scientist at ViaSat.

Diana Sosa Martín, Visiting Assistant Professor of Mathematics, Purdue University, 2008–2009.
Currently an Assistant Professor of Mathematics at University of La Laguna, Spain.

Graduate Students Advised (Primary Advisor)

David Cavender (dissertation advisor)
Ph.D. student, Mathematics, University of California, San Diego.

Kehan Long (dissertation advisor)
Ph.D. candidate, Mathematics, University of California, San Diego.

Khoa Tran (dissertation advisor)
Ph.D. candidate, Mathematics, University of California, San Diego.

Kevin Ostrowski (dissertation advisor)
Ph.D. candidate, Physics, University of California, San Diego.

Valentin Duruisseaux (dissertation advisor)
Ph.D., Mathematics, University of California, San Diego, Fall 2023.

Brian Tran (dissertation advisor)
(NSF Graduate Research Fellow, ARCS Foundation Fellow, Powell Dissertation Award)
Ph.D., Mathematics, University of California, San Diego, Spring 2023.
Currently a Mark Kac Applied Mathematics Fellow at Los Alamos National Laboratory.

Xuefeng Shen (dissertation advisor)
Ph.D., Mathematics, University of California, San Diego, Winter 2019.
Currently a Research Scientist at Momenta.ai.

Jeremy Schmitt (dissertation advisor)
Ph.D., Mathematics, University of California, San Diego, Spring 2017.
Currently an Analytic Scientist II at FICO.

Joe Salamon (co-advised with Michael J. Holst)
Ph.D., Physics, University of California, San Diego, Summer 2016.
Currently Department Chair and an Assistant Professor of Physics at MiraCosta College.

Gautam Wilkins (dissertation advisor)
Ph.D., Mathematics, University of California, San Diego, Spring 2016.
Currently a Software Engineer at Voleon.

Helen Parks (dissertation advisor) (NSF Graduate Research Fellow)
Ph.D., Mathematics, University of California, San Diego, Spring 2015.
Currently a Research Scientist at Intel.

James Hall (dissertation advisor)
Ph.D., Mathematics (Computational Science), University of California, San Diego, Spring 2013.
Currently a Research Scientist at Microsoft.

Taeyoung Lee (co-advised with N. Harris McClamroch)
(Distinguished Achievement Award, Ivor K. Mclvor Award, BGCE Student Paper Prize finalist, Rackham International Student Fellow, Rackham Predoctoral Fellow)
Ph.D., Aerospace Engineering, University of Michigan, Ann Arbor, Spring 2008.
Currently a Professor of Mechanical and Aerospace Engineering at George Washington University.

Masako Kishida (co-advised with Dennis S. Bernstein)
M.S., Applied and Interdisciplinary Mathematics, University of Michigan, Ann Arbor, Spring 2006.
Currently an Associate Professor of Principles of Informatics at the National Institute of Informatics, Tokyo.

Graduate Students Advised (Committee Member)

Thai Duong (dissertation committee member, advisor: Nikolay Atanasov)
Ph.D. candidate, Electrical and Computer Engineering, University of California, San Diego.
Chad McKell (dissertation committee member, advisors: Albert Chern, Miller Puckette)
Ph.D. candidate, Music, University of California, San Diego.
Chuqing Shi (dissertation committee member, advisor: Li-Tien Cheng)
Ph.D. candidate, Mathematics, University of California, San Diego.
Masih Haseli (dissertation committee member, advisor: Jorge Cortés)
Ph.D. candidate, Mechanical and Aerospace Engineering, University of California, San Diego.
Ahmed Allibhoy (dissertation committee member, advisor: Jorge Cortés)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Fall 2023.
Parth Paritosh (dissertation committee member, advisors: Sonia Martínez and Nikolay Atanasov)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Fall 2023.
Tianyi Chu (dissertation committee member, advisors: Oliver Schmidt and Stefan Llewellyn Smith)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Fall 2023.
Kyle Gwirtz (dissertation committee member, advisor: Matthias Morzfeld)
Ph.D., Geophysics, University of California, San Diego, Fall 2021.
Priyank Srivastava (dissertation committee member, advisor: Jorge Cortés)
Ph.D. candidate, Mechanical and Aerospace Engineering, University of California, San Diego.
Pio Ong (dissertation committee member, advisor: Jorge Cortés)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Fall 2021.
Aaron Nelson (dissertation committee member, advisor: Rayan Saab)
Ph.D., Mathematics, University of California, San Diego, Fall 2019.
Georgios Boutselis (dissertation committee member, advisor: Evangelos Theodorou)
Ph.D., Aerospace Engineering, Georgia Institute of Technology, Fall 2019.
Anna Miller (dissertation committee member, advisor: Henry Abarbanel)
Ph.D., Physics, University of California, San Diego, Spring 2021.
Kurt Talke (dissertation committee member, advisor: Thomas R. Bewley)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Summer 2021.
Xinyuan Wang (dissertation committee member, advisor: Chung-Kuan Cheng)
Ph.D., Computer Engineering, University of California, San Diego, Summer 2020.
David Lenz (dissertation committee member, advisor: Randolph E. Bank)
Ph.D., Mathematics, University of California, San Diego, Summer 2020.
Yi Luo (dissertation committee member, advisor: Bo Li)
Ph.D. candidate, Mathematics, University of California, San Diego.
Jor-el Briones (dissertation committee member, advisor: Michael J. Holst)
Ph.D. candidate, Mathematics, University of California, San Diego.
Alexander Georges (dissertation committee member, advisor: David A. Meyer)
Ph.D., Physics, University of California, San Diego, Summer 2019.
Poorya Mirkhosravi (dissertation committee member, advisor: Petr Krysl)
Ph.D., Structural Engineering, University of California, San Diego, Summer 2018.
Beth Boardman (dissertation committee member, advisor: Sonia Martínez)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Fall 2017.
Robert Moroto (dissertation committee member, advisor: Robert Bitmead)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Summer 2017.
Evan Gravelle (dissertation committee member, advisor: Sonia Martínez)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Spring 2017.
Francesca Grogan (dissertation committee member, advisor: Michael J. Holst)
Ph.D., Mathematics, University of California, San Diego, Spring 2017.
Daniel Rey (dissertation committee member, advisor: Henry Abarbanel)
Ph.D., Physics, University of California, San Diego, Spring 2017.
Shuxia Tang (dissertation committee member, advisor: Miroslav Krstić)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Spring 2016.
John Moody (dissertation committee member, advisor: Michael J. Holst)
Ph.D., Mathematics, University of California, San Diego, Spring 2016.

Graduate Students Advised (Committee Member) (Continued)

Cecily Keppel (dissertation committee member, advisor: Stefan G. Llewellyn Smith)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Spring 2016.
Geir Bogfjellmo (thesis opponent, advisor: Brynjulf Owren)
Ph.D., Mathematical Sciences, Norwegian University of Science and Technology, Summer 2015.
Shi Cheng (dissertation committee member, advisor: Michael J. Holst)
Ph.D., Mathematics, University of California, San Diego, Spring 2015.
Chris Deotte (dissertation committee member, advisor: Randolph E. Bank)
Ph.D., Mathematics (Computational Science), University of California, San Diego, Fall 2014.
Adam Mihalik (dissertation committee member, advisor: Michael J. Holst)
Ph.D., Mathematics (Computational Science), University of California, San Diego, Spring 2014.
Cameron Nowzari (dissertation committee member, advisor: Jorge Cortés)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Summer 2013.
Maximilian Metti (dissertation committee member, advisor: Randolph E. Bank)
Ph.D., Mathematics (Computational Science), University of California, San Diego, Spring 2013.
Marko Seslija (dissertation committee member, advisors: Arjan van der Schaft, Jacquelien Scherpen)
Ph.D., Mathematics, University of Groningen, Netherlands, Spring 2013.
Alexander Scheinker (dissertation committee member, advisor: Miroslav Krstić)
Ph.D., Mechanical and Aerospace Engineering, University of California, San Diego, Fall 2012.
Zubin Olikara (graduate advisory committee member, advisor: Kathleen C. Howell)
M.S., Aeronautics and Astronautics, Purdue University, Spring 2010.
Jia Li (dissertation committee member, advisor: Dongbin Xiu)
Ph.D., Mathematics, Purdue University, Fall 2009.
Nalin A. Chaturvedi (dissertation committee member, advisors: N. Harris McClamroch and Dennis S. Bernstein)
Ph.D., Aerospace Engineering, University of Michigan, Ann Arbor, Spring 2007.

Visiting Graduate Students Advised

Álvaro Rodríguez Abella, Ph.D. student, Mathematics, Instituto de Ciencias Matemáticas, Madrid, Spain.
Yiqun Li, Ph.D., Mathematics, Harbin Institute of Technology, China.
Zahra Ebrahimzadeh, Ph.D., Mechanical Engineering, Isfahan University of Technology, Iran.
Cuicui Liao, Ph.D., Mathematics, Harbin Institute of Technology, China.
Tomoki Ohsawa, Ph.D., Applied and Interdisciplinary Mathematics, University of Michigan, Ann Arbor.
Giulia Ortolan, Ph.D., Information Engineering, University of Padova, Italy.
Jingjing Zhang, Ph.D., Institute of Computational Mathematics, Chinese Academy of Sciences, Beijing.

Undergraduate Students Advised

Brian Tran, NSF Graduate Fellow, B.S. Mathematics (Highest Honors), 2017.
Currently a Ph.D. student in Mathematics at UC San Diego.
Leilani Gilpin, NSF Graduate Fellow, B.S. Mathematics (Honors), 2011.
Currently a Ph.D. student in Electrical Engineering and Computer Science, MIT.

Editorial Boards

Editor, *Journal of Nonlinear Science* (Springer), 2008–present.
Advisory Board, *International Journal of Computer Mathematics* (Taylor and Francis), 2022–present.
Editor, *Journal of Computational Dynamics* (American Institute of Mathematical Sciences), 2011–present.
Editor, *Geometric Mechanics* (World Scientific), 2023–present.
Editor, *Journal of Geometric Mechanics* (American Institute of Mathematical Sciences), 2009–2023.
Editorial Advisor, *Journal of Computation and Mathematics* (London Mathematical Society), 2011–2017.
Associate Editor, *Journal on Control and Optimization* (SIAM), 2012–2017.

Grant Reviews

Panel member, Transregional Collaborative Research Centre, Deutsche Forschungsgemeinschaft.	Feb 2022
Panel member, Engineering, National Science Foundation.	Jan 2022
Mail referee, Young Investigator Program, Air Force Office of Scientific Research.	Aug 2021
Mail referee, Mathematical Sciences, Deutsche Forschungsgemeinschaft.	Aug 2020
Mail referee, Young Investigator Program, Air Force Office of Scientific Research.	Jul 2020
Panel member, Transregional Collaborative Research Centre, Deutsche Forschungsgemeinschaft.	Jan 2020
Mail referee, Mathematical Sciences, Deutsche Forschungsgemeinschaft.	Mar 2019
Panel member, Mathematical Sciences, National Science Foundation.	Oct 2014
Mail referee, Geometric Analysis, National Science Foundation.	Feb 2014
Panel member, Mathematical Sciences, National Science Foundation.	Oct 2013
Panel member, Mathematical Sciences, National Science Foundation.	Nov 2011
Mail referee, International Science and Engineering, National Science Foundation.	Mar 2011
Mail referee, Applied Mathematics, National Science Foundation.	Mar 2010
Panel member, Computational Mathematics, National Science Foundation.	Mar 2010
Panel member, Mathematical Sciences Graduate Research Fellowship, National Science Foundation.	Feb 2010
Panel member, Applied Mathematics, National Science Foundation.	Mar 2009
Panel member, Computational Mathematics, National Science Foundation.	Mar 2008

Reviewer, *Air Force Office of Scientific Research*, *FWO (Fonds Wetenschappelijk Onderzoek) Belgium*, *Georgia National Science Foundation*, *International Centre for Mathematical Sciences in Edinburgh*, *Isaac Newton Institute for Mathematical Sciences*, *NSERC (Natural Sciences and Engineering Research Council) Canada*, *NWO (Netherlands Organisation for Scientific Research) Netherlands*, *Swiss National Science Foundation.*

Refereeing Activities

Referee, *Advances in Difference Equations*, *Aerospace Science and Technology*, *American Mathematical Monthly*, *Applied Numerical Mathematics*, *ASME Journal of Applied Mechanics*, *Automatica*, *BIT Numerical Mathematics*, *Celestial Mechanics and Dynamical Astronomy*, *Chinese Journal of Aeronautics*, *Communications in Computational Physics*, *Communications in Contemporary Mathematics*, *Communications in Numerical Methods in Engineering*, *Computational Science and Discovery*, *Computer Methods in Applied Mechanics and Engineering*, *Differential Equations and Dynamical Systems*, *Discrete & Continuous Dynamical Systems (Series B,S)*, *ESAIM: Control, Optimisation and Calculus of Variations*, *Foundations of Computational Mathematics*, *IEEE Transactions on Automatic Control*, *IEEE Transactions on Control Systems Technology*, *IET Control Theory and Applications*, *IMA Journal of Numerical Analysis*, *International Journal of Non-Linear Mechanics*, *International Journal for Numerical Methods in Engineering*, *Journal of Computational Physics*, *Journal of Mathematical Imaging and Vision*, *Journal of Mathematical Physics*, *Journal of Nonlinear Science*, *Journal of Physics A*, *Journal of Symplectic Geometry*, *Mathematical and Computer Modelling*, *Nonlinearity*, *Numerical Algorithms*, *Numerische Mathematik*, *Pacific Journal of Mathematics*, *Physica D*, *Physics Letters A*, *Proceedings of the Royal Society A*, *Reliable Computing*, *SIAM Applied Dynamical Systems*, *SIAM Multiscale Modeling and Simulation*, *SIAM Journal on Control and Optimization*, *SIAM Journal on Mathematical Analysis*, *SIAM Journal on Numerical Analysis*, *SIAM Journal on Scientific Computing*, *Symmetry, Integrability & Geometry: Methods & Applications*, *Soft Computing and Automation Journal*, *Transport in Porous Media.*

Refereeing Activities (continued)

Reviewer, *IEEE Conference on Decision and Control 2005–2009, 2011, 2012*, *IEEE Multi-conference on Systems and Control 2007, 2009*, *American Control Conference 2008–2011*, *IFAC 2011*, *ICNAAM 2009, 2010*, *Mathematical Reviews*, *Springer Books*.

Professional Service, Conference, Workshop, and Minisymposium Organization

Treasurer, Society for the Foundations of Computational Mathematics. 2023–present
Co-organizer, Geometric Integration and Computational Mechanics Workshop, Foundations of Computational Mathematics, Paris, France. Jun 2023
Co-organizer, Geometric Learning for Mechanistic Modeling and Material Designs minisymposium, MMLDT-CSET Conference, San Diego, CA. Sep 2021
Co-organizer, Flash GAMP (Geometric Algorithms and Methods in Physics) Workshop, online. Jun 2021
Co-organizer, Geometric Integration and Computational Mechanics Workshop, Foundations of Computational Mathematics, Vancouver, Canada. Jun 2020
Co-organizer, Structure-Preserving Geometric Discretization of Physical Systems, Princeton Center for Theoretical Science, Princeton, NJ. Feb 2020
Organizing committee, Gone Fishing Conference on Poisson Geometry, La Jolla, CA. Mar 2018
Organizing committee, German-American Kavli Frontiers of Science Symposium, Potsdam, Germany. Apr 2016
Local organizing committee member, US National Congress Computational Mechanics, San Diego, CA. Jul 2015
Judge, Student Poster Competition, US National Congress Computational Mechanics, San Diego, CA. Jul 2015
Organizing committee member, German-American Kavli Frontiers of Science Symposium, Irvine, CA. Apr 2014
Local organizing committee member, Pacific Coast Gravity Meeting, La Jolla, CA. Mar 2014
Selection committee member, John Butcher Prize in Numerical Analysis, SciCADE, Valladolid, Spain. Sep 2013
Co-organizer, smooth and discrete geometrical approaches to control, SIAM Controls, San Diego, CA. Jul 2013
Co-organizer, computational methods for geometric PDEs minisymposium, ICIAM, Vancouver, Canada. Jul 2011
Organizing committee member, geometric methods for optimal control semester, Madrid, Spain. Jul–Dec 2010
Co-organizer, Sixth Annual Structured Integrators Workshop, UCSD, La Jolla, CA. Apr 2010
Co-organizer, 26th Pacific Coast Gravity Meeting, UCSD, La Jolla, CA. Mar 2010
Co-organizer, control of mechanical systems special session, IEEE CDC 2009, Shanghai, China. Dec 2009
Organizer, computational mechanics minisymposium, SciCADE 2009, Beijing, China. May 2009
Co-organizer, geometric mechanics and its applications minisymposium (MS 121), SIAM DS09. May 2009
Co-organizer, Fifth Annual Structured Integrators Workshop, Caltech, Pasadena, CA. May 2009
Co-organizer, nonlinear dynamics and control of mechanical systems invited session, IEEE CDC. Dec 2006
Co-organizer, contemporary dynamical systems special session, AMS Annual Meeting. Jan 2006
Co-organizer, geometric dynamics and its applications minisymposium (MS 59, 70), SIAM DS05. May 2005
Co-organizer, CIMMS Workshop on Discrete Geometry for Mechanics, Pasadena, CA. Oct 2003
Co-organizer, discrete geometry and geometric integration minisymposium (MS 38, 62), SIAM DS03. May 2003
Co-organizer, CIMMS Workshop on Networks, Optimization and Duality, Pasadena, CA. July 2002
Co-organizer, geometric integration minisymposium (MS 51, 69), SIAM DS01. May 2001

University Service and Outreach Activities

Chair, Fiscal/IT Committee, Mathematics, UCSD.	2023–2024
Member, Senate-Administration Workgroup on Math Preparation, UCSD.	2023
Chair, Undergraduate Program Review Committee for German Studies, UCSD.	2023
Member, Qualifying Examination Review Committee, Mathematics, UCSD.	2023
Member, Dean of Engineering Review Committee, UCSD.	2023
Member, Undergraduate Council, Academic Senate, UCSD.	2022–2024
Co-Director, CSME Graduate Program, UCSD.	2020–present
Faculty Leadership Academy Scholar, UCSD	2021
Faculty Mediator, Center for Faculty Diversity and Inclusion, UCSD.	2018–present
Member, CSME Graduate Program Executive Committee, UCSD.	2013–present
Member, CSME Graduate Program Advisory Committee, UCSD.	2010–present
Mathematics Representative (Alternate), Representative Assembly of the Academic Senate, UCSD.	2021–2023
Member, Committee on Teaching–Faculty, Mathematics, UCSD.	2019–2023
Area Course Coordinator–Numerical/CSME, Mathematics, UCSD.	2017–2019, 2021–2022
Member, Course Textbook and Syllabi Committee, Mathematics, UCSD.	2020–2021
Faculty Advisor, Course Articulation, Mathematics, UCSD.	2019–2020
Member, Academic Senate Committee on International Education, UCSD.	2017–2020
Math 18/20D MATLAB Coordinator, Mathematics, UCSD.	2018–2019
Education Abroad Program Advisor, Mathematics, UCSD.	2018–2019
Member, Mathematics Graduate Admissions Committee, UCSD.	2009–2014, 2018–2019
Graduate Advisor, Mathematics, UCSD.	2017–2018
Undergraduate Student Colloquium Coordinator, Mathematics, UCSD.	2017
Faculty Advisor, Applied Mathematics and Scientific Computation Major, UCSD.	2009–2014, 2015–2017
Member, Mathematics Undergraduate Honors and Awards Committee, UCSD.	2010–2014, 2015–2017
Member, Selection Committee, Robert Skelton Systems and Control Dissertation Award, UCSD.	2015
Revelle College Representative, Representative Assembly of the Academic Senate, UCSD.	2013–2015
Revelle College Mathematics Requirements Committee, UCSD.	2014–2015
Judge, Triton Junkyard Derby, Triton Engineering Council, UCSD.	May 2011
Judge (Sigma Xi representative), Conrad Foundation's Spirit of Innovation Awards, NASA Ames, CA.	Apr 2011
Organizer, Computational and Applied Mathematics Seminar, Purdue University.	Fall 2008
Member, Strategic Plan Engagement Pillar Group Committee, College of Science, Purdue University.	2008
Member, Computer Committee, Mathematics, Purdue University.	2007–2008
Judge, Undergraduate Research and Poster Symposium, Purdue University.	Apr 2007
Faculty advisor, Purdue Singaporean Students Association.	2006–2009
Panelist, Proposal Writing, Faculty Professional Development Program, University of Michigan.	Sep 2005
Panelist, Graduate School Discussion Panel, Undergraduate Math Club, University of Michigan.	Oct 2004
Officer, SIAM Student Chapter, Caltech.	2004
Member, Caltech Project for Effective Teaching, Caltech.	2002–2004
Judge, Semifinals, Doris S. Perpall Speaking Competition, Caltech.	Nov 2003
Judge, Mathematics/Applied Mathematics Session, Caltech SURF Seminar Day	Oct 2002, 2003
Member, Academics Committee, Graduate Student Council, Caltech.	2002
Coordinator, Geometric Mechanics Seminar, Control and Dynamical Systems, Caltech.	2002
Graduate Student Representative, Committee on Institute Programs, Caltech.	2001–2003
Director, CDS Option Representative, Graduate Student Council, Caltech.	2001–2002
Member, Committee on Teaching Assistant Training, Graduate Dean's Office, Caltech.	2001–2002
Student Representative, Feynman Teaching Prize Selection Committee, Caltech.	2000
Director for Academic Affairs, Associated Students of Caltech (ASCIT).	1999–2000
Chairman, Academics and Research Committee, Caltech.	1999–2000
Student Representative, Core Curriculum Steering Committee, Caltech.	1999–2000
Student Representative, Academic Policies and Curriculum Committee, Caltech.	1997–1999

Professional Memberships

American Mathematical Society, Foundations of Computational Mathematics (Geometric Integration Interest Group), London Mathematical Society, Mathematical Association of America, Singapore Mathematical Society, Society for Industrial and Applied Mathematics (Dynamical Systems Activity Group).

Melvin Leok: Curriculum Vitae

Teaching Experience

University of California, San Diego

Instructor, Information Geometry and its Applications (Math 273)	Winter 20/22
Instructor, Projects in Computational and Applied Mathematics (Math 179/279)	Spring 19
Instructor, Numerical Approximation and Nonlinear Equations (Math 270B)	Winter 19
Instructor, Optimization on Manifolds (Math 273)	Spring 17/18/22, Winter 21
Instructor, Applied and Computational Topology (Math 273)	Winter 17/18, Fall 20
Instructor, Geometric Mechanics (Math 277)	Winter 12/18, Spring 15
Instructor, Geometric Numerical Integration (Math 273)	Fall 09/10/12/13/16/17, Winter 16, Spring 20/21
Instructor, Numerical Ordinary Differential Equations (Math 270C)	Spring 11/12/13/14/15/16/19/20
Instructor, Numerical Methods for Physical Modeling (Math 174/274)	Fall 11,15,21
Instructor, Introduction to Numerical Analysis: Numerical Linear Algebra (Math 170A)	Fall 10
Instructor, Introduction to Numerical Analysis: Approximation Theory (Math 170B)	Winter 10/11/13
Instructor, Introduction to Numerical Analysis: Numerical ODEs (Math 170C)	Spring 12/13/14/16/17/21
Instructor, Introduction to Differential Equations (Math 20D)	Winter 10

California Institute of Technology

Instructor, Introductory Concepts for Dynamical Systems (CDS 104)	Spring 09

Purdue University

Instructor, Numerical Analysis (Math/CS 514)	Fall 08
Instructor, Geometric Numerical Integration (Math 692A)	Spring 08
Instructor, Ordinary Differential Equations (Math 366)	Spring 08
Instructor, Introduction to Differential Geometry and Topology (Math 562)	Fall 07
Instructor, Ordinary Differential Equations (Math 266)	Spring 07

University of Michigan, Ann Arbor

Instructor, Numerical Methods for Engineers and Scientists (Math 371/Engr 371)	Winter 05/06, Fall 05
Instructor, Applied Honors Calculus II (Math 156)	Fall 04

Melvin Leok: Curriculum Vitae

Publications Available for download at `http://www.math.ucsd.edu/~mleok/`

Books

B1. *Global Formulations of Lagrangian and Hamiltonian Dynamics on Manifolds: A Geometric Approach to Modeling and Analysis* (with T. Lee, N.H. McClamroch), Interaction of Mechanics and Mathematics series, XXVII+539 pages, 49 illustrations, ISBN 978-3-319-56951-2, Springer, 2018.

Refereed Journal Papers

J1. *Estimating the Attractor Dimension of the Equatorial Weather System*, Acta Phys. Pol. A **85**, S27–S35, 1994.

J2. *Discrete Poincaré Lemma* (with M. Desbrun, J.E. Marsden), Appl. Numer. Math. **53** (2–4), 231–248, 2005.

J3. *Discrete Routh Reduction* (with S.M. Jalnapurkar, J.E. Marsden, M. West), J. Phys. A: Math. Gen. **39**, 5521-5544 (Geometric Integration Special Issue, invited paper), 2006.

J4. *Lie Group Variational Integrators for the Full Body Problem* (with T. Lee, N.H. McClamroch), Comput. Methods Appl. Mech. Engrg. **196** (29-30), 2907–2924, 2007.

J5. *Lie Group Variational Integrators for the Full Body Problem in Orbital Mechanics* (with T. Lee, N.H. McClamroch), Celestial Mechanics and Dynamical Astronomy **98** (2), 121–144, 2007.

J6. *Global Optimal Attitude Estimation using Uncertainty Ellipsoids* (with T. Lee, A.K. Sanyal, N.H. McClamroch), Systems and Control Letters, **57** (3), 236–245, 2008.

J7. *Optimal Attitude Control of a Rigid Body using Geometrically Exact Computations on $SO(3)$* (with T. Lee, N.H. McClamroch), Journal of Dynamical and Control Systems **14** (4), 465–487, 2008.

J8. *Geometric Structure-Preserving Optimal Control of the Rigid Body* (with A.M. Bloch, I.I. Hussein, A.K. Sanyal), Journal of Dynamical and Control Systems **15** (3), 307–330, 2009.

J9. *Computational Geometric Optimal Control of Rigid Bodies* (with T. Lee, N.H. McClamroch), Brockett Legacy Special Issue, Communications in Information and Systems **8** (4), 445–472, 2008.

J10. *Controlled Lagrangians and Stabilization of Discrete Mechanical Systems* (with A.M. Bloch, J.E. Marsden, D.V. Zenkov), Discrete and Continuous Dynamical Systems – Series S (Nonholonomic Constraints in Mechanics and Optimal Control Theory Special Issue), **3** (1), 19–36, 2010.

J11. *Lagrangian Mechanics and Variational Integrators on Two-Spheres* (with T. Lee, N.H. McClamroch), International Journal for Numerical Methods in Engineering **79** (9), 1147–1174, 2009.

J12. *Nonlinear Dynamics of the 3D Pendulum* (with N.A. Chaturvedi, T. Lee, N.H. McClamroch), Journal of Nonlinear Science, **21** (1), 3–32, 2011.

J13. *Discrete Hamiltonian Variational Integrators* (with J. Zhang), IMA Journal of Numerical Analysis, **31** (4), 1497–1532, 2011.

J14. *Computational Dynamics of a 3D Elastic String Pendulum Attached to a Rigid Body and an Inertially Fixed Reel Mechanism* (with T. Lee, N.H. McClamroch), Nonlinear Dynamics, **64** (1-2), 97–115, 2011.

J15. *On the Geometry of Multi-Dirac Structures and Gerstenhaber Algebras* (with J. Vankerschaver, H. Yoshimura), Journal of Geometry and Physics, **61** (8), 1415–1425, 2011.

J16. *Variational and Geometric Structures of Discrete Dirac Mechanics* (with T. Ohsawa), Foundations of Computational Mathematics, **11** (5), 529–562, 2011.

J17. *Discrete Hamilton–Jacobi Theory* (with A.M. Bloch, T. Ohsawa), SIAM Journal on Control and Optimization, **49** (4), 1829–1856, 2011.

J18. *Prolongation–Collocation Variational Integrators* (with T. Shingel), IMA Journal of Numerical Analysis, **32** (3), 1194–1216, 2012.

J19. *General Techniques for Constructing Variational Integrators* (with T. Shingel), Frontiers of Mathematics in China (Special issue on computational mathematics, invited paper), **7** (2), 273–303, 2012.

J20. *The Hamilton–Pontryagin Principle and Multi-Dirac Structures for Classical Field Theories* (with J. Vankerschaver, H. Yoshimura), Journal of Mathematical Physics, **53** (7), 072903 (25 pages), 2012.

J21. *Nonlinear Robust Tracking Control of a Quadrotor UAV on $SE(3)$* (with T. Lee, N.H. McClamroch), Asian Journal of Control, **15** (3), 1–18, 2013.

J22. *Hamilton–Jacobi Theory for Degenerate Lagrangian Systems with Holonomic and Nonholonomic Constraints* (with T. Ohsawa, D. Sosa), Journal of Mathematical Physics, **53** (7), 072905 (29 pages), 2012.

J23. *Dirac Structures and Hamilton-Jacobi Theory for Lagrangian Mechanics on Lie Algebroids* (with D. Sosa), Journal of Geometric Mechanics, **4** (4), 421–442, 2012.

J24. *Generating functionals and Lagrangian partial differential equations* (with C. Liao, J. Vankerschaver), Journal of Mathematical Physics, **54** (8), 082901 (22 pages), 2013.

J25. *A novel formulation of point vortex dynamics on the sphere: geometrical and numerical aspects* (with J. Vankerschaver), Journal of Nonlinear Science, **24** (1), 1–37, 2014.

Publications (continued) Available for download at `http://www.math.ucsd.edu/~mleok/`

Refereed Journal Papers (Continued)

J26. *Symplectic Semiclassical Wave Packet Dynamics* (with T. Ohsawa), Journal of Physics A, **46** (40), 405201 (28 pages), 2013.

J27. *High-Fidelity Numerical Simulation of Complex Dynamics of Tethered Spacecraft* (with T. Lee, N.H. McClamroch), Acta Astronautica, **99**, June–July, 215–230, 2014.

J28. *A Novel Variational Formulation for Thermoelastic Problems* (with Z. Ebrahimzadeh, M. Mahzoon), Communications in Nonlinear Science and Numerical Simulation, **22** (1–3), 263–268, 2015.

J29. *Spectral Variational Integrators* (with J. Hall), Numerische Mathematik, **130** (4), 681–740, 2015.

J30. *Lie Group Spectral Variational Integrators* (with J. Hall), Foundations of Computational Mathematics, **17** (1), 199–257, 2017.

J31. *Variational integrators for interconnected Lagrange–Dirac systems* (with H. Parks), Journal of Nonlinear Science, **27** (5), 1399–1434, 2017.

J32. *Geometric Formulations of Furuta Pendulum Control Problems* (with T. Lee, N.H. McClamroch), Mathematics in Engineering, Science and Aerospace, **7** (1), 69–81, 2016.

J33. *Spectral-Collocation Variational Integrators* (with Y. Li, B. Wu), Journal of Computational Physics, **332**, 83–98, 2017.

J34. *Properties of Hamiltonian Variational Integrators* (with J.M. Schmitt), IMA Journal of Numerical Analysis, **38**, 377–398, 2018.

J35. *Spectral variational integrators for semi-discrete Hamiltonian wave equations* (with Y. Li, B. Wu), Journal of Computational and Applied Mathematics, **325**, 56–73, 2017.

J36. *Interpolation on Symmetric Spaces via the Generalized Polar Decomposition* (with E.S. Gawlik), Foundations of Computational Mathematics, **18** (3), 757–788, 2018.

J37. *Iterative Computation of the Fréchet Derivative of the Polar Decomposition* (with E.S. Gawlik), SIAM Journal on Matrix Analysis and Applications, **38** (4), 1354–1379, 2017.

J38. *Connecting Information Geometry and Geometric Mechanics* (with J. Zhang), Entropy (Special Issue on Information Geometry II), **19** (10), 518 (31 pages), 2017.

J39. *Lagrangian and Hamiltonian Taylor Variational Integrators* (with J.M. Schmitt, T. Shingel), BIT Numerical Mathematics, **58** (2), 457–488, 2018.

J40. *Embedding-Based Interpolation on the Special Orthogonal Group* (with E.S. Gawlik), SIAM Journal on Scientific Computing, **40** (2), A721–A746, 2018.

J41. *High-Order Retractions on Matrix Manifolds* (with E.S. Gawlik), SIAM Journal on Matrix Analysis and Applications, **39** (2), 801–828, 2018.

J42. *Construction and comparison of multidimensional spectral variational integrators and spectral collocation methods* (with Y. Li, B. Wu), Applied Numerical Mathematics, **132**, 35–50, 2018.

J43. *Constructing Equivalence-Preserving Dirac Variational Integrators with Forces* (with H. Parks), IMA Journal of Numerical Analysis, **39** (4), 1706–1726, 2019.

J44. *Geometric Exponential Integrators* (with X. Shen), Journal of Computational Physics, **382**, 27–42, 2019.

J45. *Variational Discretizations of Gauge Field Theories using Group-equivariant Interpolation*, Foundations of Computational Mathematics, **19** (5), 965–989, 2019.

J46. *Adaptive Hamiltonian Variational Integrators and Symplectic Accelerated Optimization* (with V. Duruisseaux, J.M. Schmitt), SIAM Journal of Scientific Computing, **43** (4), A2949–A2980 (32 pages), 2021.

J47. *Multisymplectic Hamiltonian Variational Integrators* (with B. Tran), International Journal of Computer Mathematics (Special Issue on Geometric Numerical Integration, Twenty-Five Years Later), **99**(1), 113–157, 2022.

J48. *A Variational Formulation of Accelerated Optimization on Riemannian Manifolds* (with V. Duruisseaux), SIAM Journal on Mathematics of Data Science, **4** (2), 649–674, 2022.

J49. *High-order symplectic Lie group methods on $SO(n)$ using the polar decomposition* (with X. Shen and K. Tran), Journal of Computational Dynamics, **9** (4), 529–551, 2022.

J50. *Accelerated Optimization on Riemannian Manifolds via Discrete Constrained Variational Integrators* (with V. Duruisseaux), Journal of Nonlinear Science, **32**, 42 (34 pages), 2022.

Publications (continued) Available for download at `http://www.math.ucsd.edu/~mleok/`

Refereed Journal Papers (Continued)

J51. *Safe control synthesis with uncertain dynamics and constraints* (with K. Long, V. Dhiman, J. Cortés, N. Atanasov), IEEE Robotics and Automation Letters, **7**(3), 7295–7302, 2022.

J52. *Time-adaptive Lagrangian Variational Integrators for Accelerated Optimization on Manifolds* (with V. Duruisseaux), Journal of Geometric Mechanics, **15**(1), 224–255, 2023.

J53. *Discrete Dirac reduction of implicit Lagrangian systems with abelian symmetry groups* (with A. Rodríguez Abella), Journal of Geometric Mechanics, **15** (1), 319–356, 2023.

J54. *Nearly-periodic maps and geometric integration of noncanonical Hamiltonian systems* (with J.W. Burby, E. Hirvijoki), Journal of Nonlinear Science, **33**, 38 (43 pages), 2023.

J55. *Practical Perspectives on Symplectic Accelerated Optimization* (with V. Duruisseaux), Optimization Methods and Software, published online, 39 pages, 2023.

J56. *Geometric Methods for Adjoint Systems* (with B. Tran), Journal of Nonlinear Science, **34**, 25 (75 pages), 2024.

Refereed Book Chapters

BC1. *Discrete Control Systems* (with T. Lee, N. H. McClamroch), invited article for the Springer Encyclopedia of Complexity and Systems Science, 2002–2019, 2009. Reprinted in Mathematics of Complexity and Dynamical Systems, 143–159, 2011.

BC2. *Variational Integrators*, invited article for the Springer Encyclopedia of Applied and Computational Mathematics, 1519–1525, 2015.

Refereed Conference Papers

C1. *A Lie Group Variational Integrator for the Attitude Dynamics of a Rigid Body with Applications to the 3D Pendulum* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Control Applications, 962–967, 2005.

C2. *Controlled Lagrangians and Stabilization of the Discrete Cart-Pendulum System* (with A.M. Bloch, J.E. Marsden, D.V. Zenkov), Proc. IEEE Conf. on Decision and Control, 6579–6584, 2005.

C3. *Attitude Maneuvers of a Rigid Spacecraft in a Circular Orbit* (with T. Lee, N.H McClamroch), Proc. American Control Conf., 1742–1747, 2006.

C4. *Polyhedral Potential and Variational Integrator Computation of the Full Two Body Problem* (with E. Fahnestock, T. Lee, N.H. McClamroch, D. Scheeres), Proc. AIAA/AAS Astrodynamics Conf., AIAA-2006-6289, 2006.

C5. *Optimal Control of a Rigid Body using Geometrically Exact Computations on SE(3)* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 2710–2715, 2006.

C6. *Deterministic Global Attitude Estimation* (with T. Lee, A.K. Sanyal, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 3174–3179, 2006.

C7. *Controlled Lagrangians and Potential Shaping for Stabilization of Discrete Mechanical Systems* (with A.M. Bloch, J.E. Marsden, D.V. Zenkov), Proc. IEEE Conf. on Decision and Control, 3333–3338, 2006.

C8. *A Discrete Variational Integrator for Optimal Control Problems on SO(3)* (with A.M. Bloch, I.I. Hussein, A.K. Sanyal), Proc. IEEE Conf. on Decision and Control, 6636–6641, 2006.

C9. *Global Attitude Estimation using Single Direction Measurements* (with T. Lee, N.H. McClamroch, A.K. Sanyal), Proc. American Control Conf., 3659–3664, 2007.

C10. *Optimal Attitude Control for a Rigid Body with Symmetry* (with T. Lee, N.H. McClamroch), Proc. American Control Conf., 1073–1078, 2007.

C11. *Propagation of Uncertainty in Rigid Body Attitude Flows* (with N.A. Chaturvedi, T. Lee, N.H. McClamroch, A.K. Sanyal), Proc. IEEE Conf. on Decision and Control, 2689–2694, 2007.

C12. *A Combinatorial Optimization Problem for Spacecraft Formation Reconfiguration* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 5370–5375, 2007.

C13. *Matching and stabilization of discrete mechanical systems* (with A.M. Bloch, J.E. Marsden, D.V. Zenkov), Proc. Appl. Math. Mech. **7**, 1030603–1030604, 2007.

C14. *Time Optimal Attitude Control for a Rigid Body* (with T. Lee, N.H. McClamroch), Proc. American Control Conf., 5210–5215, 2008.

C15. *Global Symplectic Uncertainty Propagation on SO(3)* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 61–66, 2008.

C16. *Dynamics of Connected Rigid Bodies in a Perfect Fluid* (with T. Lee, N.H. McClamroch), Proc. American Control Conf., 408–413, 2009.

C17. *Dynamics of a 3D Elastic String Pendulum* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 3347–3352, 2009.

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Refereed Conference Papers (continued)

C18. *Computational Geometric Optimal Control of Connected Rigid Bodies in a Perfect Fluid* (with T. Lee, N.H. McClamroch), Proc. American Control Conf., 5985–5990, 2010.

C19. *Discrete Dirac Structures and Implicit Discrete Lagrangian and Hamiltonian Systems* (with T. Ohsawa), XVIII International Fall Workshop on Geometry and Physics, 91–102, AIP Conference Proceedings 1260, 2010.

C20. *Geometric Tracking Control of a Quadrotor UAV on SE(3)* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 5420–5425, 2010.

C21. *Discrete Hamilton-Jacobi Theory and Discrete Optimal Control* (with T. Ohsawa, A.M. Bloch), Proc. IEEE Conf. on Decision and Control, 5438–5443, 2010.

C22. *Stokes-Dirac Structures through Reduction of Infinite-Dimensional Dirac Structures* (with J. Vankerschaver, H. Yoshimura, J.E. Marsden), Proc. IEEE Conf. on Decision and Control, 6265–6270, 2010.

C23. *Geometric Numerical Integration of Complex Dynamics of Tethered Spacecraft* (with T. Lee, N.H. McClamroch), Proc. American Control Conf., 1885–1891, 2011.

C24. *Stable Manifolds of Saddle Points for Pendulum Dynamics on S^2 and $SO(3)$* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 3915–3921, 2011.

C25. *Nonlinear Robust Tracking Control of a Quadrotor UAV on $SE(3)$* (with T. Lee, N.H. McClamroch), Proc. American Control Conf., 4649–4654, 2012.

C26. *Dynamics and Control of a Chain Pendulum on a Cart* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 2502–2508, 2012.

C27. *Hamel's Formalism and Variational Integrators on a Sphere* (with A.M. Bloch, D.V Zenkov), Proc. IEEE Conf. on Decision and Control, 7504–7510, 2012.

C28. *Space-Time Finite-Element Exterior Calculus and Variational Discretizations of Gauge Field Theories* (with J. Salamon, J. Moody), Proc. Mathematical Theory of Networks and Systems, 743–747, 2014.

C29. *Global Formulations of Lagrangian and Hamiltonian Dynamics on Embedded Manifolds* (with T. Lee, N.H. McClamroch), Proc. IMA Conf. on Mathematics of Robotics, 2015.

C30. *Global Formulations of Lagrangian and Hamiltonian Mechanics on Two-Spheres* (with T. Lee, N.H. McClamroch), Proc. IEEE Conf. on Decision and Control, 6010–6015, 2015.

C31. *Variational Symplectic Accelerated Optimization on Lie Groups* (with T. Lee, M. Tao), Proc. IEEE Conf. on Decision and Control, 233–240, 2021.

C32. *Lie Group Forced Variational Integrator Networks for Learning and Control of Robot Systems* (with V. Duruisseaux, T. Duong, N. Atanasov), Proc. Annual Learning for Dynamics and Control Conference, PMLR 211:731-744, 2023.

C33. *Simplifying Momentum-based Positive-definite Submanifold Optimization with Applications to Deep Learning* (with W. Lin, V. Duruisseaux, F. Nielsen, M.E. Khan, M. Schmidt), Proc. International Conference for Machine Learning, PMLR 202:21026-21050, 2023.

C34. *Safe Stabilizing Control for Polygonal Robots in Dynamic Elliptical Environments* (with K. Long, K. Tran, N. Atanasov), Proc. American Control Conference, accepted, 2024.

Submitted Papers

S1. *Lie Group Variational Collision Integrators for a Class of Hybrid Systems* (with K. Tran), SIAM Applied Dynamical Systems, submitted, 2024.

S2. Stabilization of Nonlinear Systems through Control Barrier Functions (with P. Mestres, K. Long, N. Atanasov, J. Cortes), Proc. IEEE Conf. on Decision and Control, submitted, 2024.

S3. *On properties of adjoint systems for evolutionary PDEs* (with B.K. Tran, B.S. Southworth), Journal of Nonlinear Science, submitted, 2024.

Papers under Revision

R1. *An Empirical Chaos Expansion Method for Uncertainty Quantification* (with G. Wilkins), under revision.

R2. *Geometric Symmetry Reduction of the Unobservable Subspace for Kalman Filtering* (with X. Shen), under revision.

R3. *Lie Group Variational Integrators for Rigid Body Dynamics using Quaternions* (with X. Shen), under revision.

R4. *Accelerated Optimization on Riemannian Manifolds via Projected Variational Integrators* (with V. Duruisseaux), under revision.

R5. *Variational Structures in Cochain Projection Based Variational Discretizations of Lagrangian PDEs* (with B. Tran), under revision.

R6. *Type II Hamiltonian Lie group variational integrators with applications to geometric adjoint sensitivity analysis* (with B. Tran), under revision.

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Preprints

P1. *Generalized Galerkin Variational Integrators*, 2004.
P2. *A Discrete Theory of Connections on Principal Bundles* (with J.E. Marsden, A.D. Weinstein), 2004.
P3. *Discrete Exterior Calculus* (with M. Desbrun, A.N. Hirani, J.E. Marsden), 2003.

Thesis

T1. *Foundations of Computational Geometric Mechanics*, Ph.D. thesis, California Institute of Technology, 2004. A preliminary version of this thesis received the *SIAM Student Paper Prize*, and the *Leslie Fox Prize in Numerical Analysis* (second prize) in 2003.

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