Taylor J. Klotz

Contact Information

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Research Interests

Geometry and symmetry of differential equations, applications to plasma physics and geometric control theory, and differential geometry in the style of Cartan.

Education

Ph.D. in Mathematics at University of Colorado at Boulder, August 2020
-Thesis Title: Geometry of Cascade Feedback Linearizable Control Systems (arxiv version)

M.A. in Mathematics from University of Colorado at Boulder, May 2017

B.S. in Applied Mathematics with Physics emphasis from University of Colorado at Colorado Springs, May 2013

Positions

Research Associate, University of Colorado at Boulder: Department of Applied Mathematics, August 2024 -current

Temporary Assistant Professor, University of Hawai'i at Mānoa, August 2021 -July 2024

Instructor, University of Colorado at Boulder, Fall 2020 - July 2021

Papers

Published and Accepted

1. T.J. Klotz, P. Vassiliou. Quotients of Invariant Control Systems, accepted pending revisions.

2. J. Clelland, T. Klotz, P. Vassiliou. Dynamic Feedback Linearization of Control Systems with Symmetry, 2024. SIGMA. Symmetry, Integrability and Geometry: Methods and Applications 20, 058 (Special Issue on Symmetry, Invariants, and their Applications in honor of Peter J. Olver)

3. R. Carney, M. Chyba, and T. Klotz, 2024. Using hybrid automata to model mitigation of global disease spread via travel restriction, Networks & Heterogeneous Media 19 (1)

4. Klotz, T.J., 2023. Geometry of cascade feedback linearizable control systems, 2023. Differential Geometry and its Applications, 90, p.102044. (arxiv version)

5. Chyba, M., Klotz, T., Mileyko, Y. and Shanbrom, C., 2023. A look at endemic equilibria of compartmental epidemiological models and model control via vaccination and mitigation. Mathematics of Control, Signals, and Systems, pp.1-31. (arxiv version)

6. Burby, J.W. and Klotz, T.J., 2020. Slow manifold reduction for plasma science. Communications in Nonlinear Science and Numerical Simulation, 89, p.105289.

7. Clelland, J.N. and Klotz, T., 2020. Beltrami fields with nonconstant proportionality factor. Archive for Rational Mechanics and Analysis, 236(2), pp.767-800. (arxiv version)

8. Dean, G., Klotz, T., Prinari, B. and Vitale, F., 2013. Dark-dark and dark-bright soliton interactions in the two-component defocusing nonlinear Schrödinger equation. Applicable Analysis, 92(2), pp.379-397.

Submitted

1. T. Klotz and P. Vassiliou. Orbital Feedback Linearization: Geometric Characterization & Construction

2. T. Klotz and G. Wilkens. Some Local Geometry of Bi-Contact Structures, (current arxiv version)

In Preparation

1. Some Geometry of Magnetic Fields for Plasma Confinement in the Style of Cartan

2. Pseudo-Focal Surfaces

3. Local Geometry of Bi-Contact Structures: Applications

Organized Conferences

Primary organizer for 2024 JMM Special Session: *Geometry and Symmetry in Differential Equations, Control, and Applications.*

Conference Talks

Using Symmetry to Construct Dynamic Feedback Linearizations, BIRS Workshop: Control, Geometry, and Topology. (2023)

Using Symmetry to Construct Dynamic Feedback Linearizations, University of Sydney Applied Mathematics Seminar. (2023)

Bi-Contact Geometry, ANU Canberra Mathematics Colloquium. (2023)

Symmetry and Explicit Integrability of Control Systems: Cascade Feedback Linearization, invited speaker, Symmetry, Invariants, and their Applications: A Celebration of Peter Olverâs 70th Birthday. (2022)

Geometry of Cascade Feedback Linearizability, invited speaker, University of Colorado at Colorado Springs Colloquium Series. (2022)

Two-Legged Copepod Motion and Euler elastica, University of Colorado at Boulder, Geometry and Analysis Seminar. (2022)

Geometry of Cascade Feedback Linearizable Control Systems, University of Hawai‘i at Mānoa Colloquium. (2021)

Geometry of Cascade Feedback Linearizable Control Systems, Symmetry and Geometry on the Southern Great Plains, Norman OK, Oklahoma University. (2020)

Conference Talks Cont.

Aspects of Cascade Feedback Linearization, Joint Mathematics Meetings: Special Session on Geometry of Differential Equations, Denver CO. (2020)

Cascade Feedback Linearization, Midwest Geometry Conference, Iowa State University, Ames, Iowa. (2019)

Dynamic and Cascade Static Feedback Linearization for the P.V.T.O.L. Control System, AMS Fall Central Sectional Meeting: Special Session on Advances on Analytical and Geometric Aspects of Differential Equations, University of Michigan at Ann Arbor. (Fall 2018)

The ultimate brownie: A guide to make the ultimate brownie pan, Mathematical Competition in Modeling Problem, SIAM: Society for Industrial and Applied Mathematics, Front Range Student Conference. (Spring 2013)

Riemannian Geometry and a little Ricci Flow, Math Fest: University of Madison, Wisconsin. (Fall 2012)

Fibonacci leaves: Finding the weight of leaves on a tree and tree Geometry, Mathematical Competition in Modeling Problem, SIAM: Society for Industrial and Applied Mathematics, Front Range Student Conference. (Spring 2012)

Soliton solutions to the defocusing VNLS equation, Rocky Mountain Section Meeting of the Mathematical Association of America, Boulder. (Spring 2011)

Other Talks

Three Geometries, University of Hawai'i Undergraduate Math Club. (2023)

Equations of Lie Type, Analysis and Geometry Seminar, University of Colorado at Boulder. (Fall 2017)

Focusing on the Inverse Scattering Transform, Analysis and Geometry Seminar, University of Colorado at Boulder. (Fall 2017)

Looking at Geometry through a Frame, Analysis and Geometry Seminar, University of Colorado at Boulder. (Fall 2016)

(Going With the) Ricci Flow, Slow Pitch Seminar, University of Colorado at Boulder. (Spring 2015)

Partial proof of the uniformization theorem using Ricci Flow, Analysis and Geometry Seminar, University of Colorado at Boulder. (Spring 2014)

Some Basics of Ricci Flow, Analysis and Geometry Seminar, University of Colorado at Boulder. (Fall 2013)

Teaching Experience

At University of Hawai'i at Mānoa

MATH 241: Calculus 1		2023-2024
MATH 302: Introduction to Ordinary Differential Equations		Spring 2023
MATH 244: Calculus 4		2022-2023
MATH 443: Differential Geometry (undergraduate)	Spring	2022 & 2024
MATH 242: Calculus 2	Fall	2021
MATH 307: Linear Algebra and Differential Equations		2021-2022

Teaching Experience Cont.

At University of Colorado, Boulder

MATH 2130: Linear Algebra for Non-math Majors	Summer	2021
MATH 1012: Quantitative Reasoning and Mathematics Skills	Spring	2021
MATH 3430: Ordinary Differential Equations		2020-2021
MATH 1212: Data and Models	Fall	2020
Calculus III Instructor		2017-2020
Calculus II Instructor	Fall	2016
Calculus II Teaching Assistant	Spring	2016
Calculus I Instructor		2014–2015
Calculus I Teaching Assistant	Spring	2014
Finite Business Mathematics Teaching Assistant	Fall	2013

At University of Colorado, Colorado Springs

Introduction to Differential Equations Supplemental Instructor		2010–2013
Higher Geometry Problem Session Leader		2010–2013
Calculus II Teaching Assistant	Fall	2010
Pre-Calculus Teaching Assistant	Summer	2011
Excel Center for Mathematics Tutor Tier 4		2011–2013

Outreach and Service

808 Mathematics Outreach Program (Spring 2023)

- Assisted with organizing and creating material for weekly engagement with various Hawaiian middle and high schools on some mathematics of epidemiology.
- Enacted said material online with students of a small hybrid school on the island of Hawai‘i.

Mathematics Department Library Committee at University of Hawai‘i at Mānoa (2023-2024)

Mathematics Department Facilities Committee at University of Hawai‘i at Mānoa (2021-2023)

Awards

NSF Mathematical Sciences Graduate Student Internship, Summer 2019
Hosting site: Los Alamos National Laboratory

Graduate School Summer Fellowship (2018)

Adele V. Leonhardy Summer Fellowship (2017)

Dean's List (2013)

Mathematical Competition in Modeling: Meritorious Winner (2010)

Relevant Skills

Programming Languages: Maple, LaTeX, Mathematica, MATLAB, Python