# Taylor J. Klotz


## Contact Information

University of Hawai'i at Mānoa
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## Research Interests

Geometry and symmetry of differential equations, geometric control theory and applications, exterior differential systems and moving frames, differential geometry broadly interpreted.

## Education

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

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

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

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

## Papers

### Published

1. Klotz, T.J., 2023. Geometry of cascade feedback linearizable control systems. Differential Geometry and its Applications, 90, p.102044.

2. 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.

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

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

5. 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. J. Clelland, T. Klotz, P. Vassiliou. Dynamic Feedback Linearization of Control Systems with Symmetry, Submitted -arXiv preprint arXiv:2103.05078.

2. R. Carney, M. Chyba, and T. Klotz. Using hybrid automata to model mitigation of global disease spread via travel restriction, Submitted

**In Preparation**

1. T. Klotz and G. Wilkens. Some Local Geometry of Bi-Contact Structures

2. T. Klotz and P. Vassiliou. Quotients of Invariant Control Systems and Applications

## Organized Conferences

1. 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 Mänoa Colloquium. (2021)

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

*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)

## Conference Talks Cont.

*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 & 2023 |
| MATH 242: Calculus 2 | Fall | 2021 |
| MATH 307: Linear Algebra and Differential Equations | | 2021-2022 |

## Teaching Experience Cont.

**At University of Colorado, Boulder**

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|---|---|---|
| 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**

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|---|---|---|
| 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