Herng Yi Cheng

Ph.D. Candidate

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Research interests

My research interests lie in *Quantitative Topology.*
    I have derived bounds on the sizes or quantities of geodesics and sweep-outs in Riemannian manifolds. My work also involves bounding the geometric complexity of topological constructions such as cohomology operations and homotopy groups.

Education

2018 B.Sc. in Mathematics, Massachusetts Institute of Technology

Publications

Journal articles

2022 Curvature-free linear length bounds on geodesics in closed Riemannian surfaces.
Transactions of the American Mathematical Society, 375(07):5217–5237, 2022

2024 Stable geodesic nets in convex hypersurfaces.
The Journal of Geometric Analysis, 34(2):1–26, 2024.

Preprints

2022 Index-zero closed geodesics and stable figure-eights in convex hypersurfaces, `arXiv:2203.07166`.

In preparation

2024 Geometric constructions of the Steenrod powers

2024 Riemannian 3-spheres that are hard to sweep out by short curves
Joint with Omar Alshawa

Grants, honours & awards

2021 Mary H. Beatty Fellowship
2022 Vanier Canada Graduate Scholarship

Invited Talks

2023 "Index-zero closed geodesics and stable geodesic nets in convex hypersurfaces"
Joint Mathematics Meetings, AMS Special Session on New Developments in Differential Geometry and Topology, Boston, USA

2023 "Index-zero closed geodesics and stable geodesic nets in convex hypersurfaces"
Topology/Geometry Zoom Seminar, University of Oregon & Wichita State University

2024 "The Geometry of the Steenrod Squares"
Joint Mathematics Meetings, AMS Special Session on Metric Geometry and Topology, San Francisco, USA

2024 "The Geometry of the Steenrod Powers"
Topology Seminar, University of California Santa Barbara, USA

Teaching

Course Instructorships

2024 Course Instructor for MAT223S Linear Algebra I

Teaching Assistantships

2019 Math Success Program for MAT188F Linear Algebra
2020 MAT187S Calculus
2020 MAT224S Linear Algebra II
2020 Math Learning Centre
2020 MAT464F Riemannian Geometry
2020 MAT138F Introduction to Proofs
2022 MAT301S Groups and Symmetries
2023 Math Learning Centre

Service

2020–2021 Organizer, Geometric Analysis Seminar for graduate students

2020–2021 Graduate Representative, Diversity and Equity Committee of the Department of Mathematics, University of Toronto

2023 Cofounder, Bird's Eye Conference
30+ mathematics graduate students introduced their fields to 70+ attendees through accessible survey talks.