Erkao Bao

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Research Interests Symplectic Geometry, Contact Geometry

Education University of Wisconsin-Madison, WI, USA

- Ph.D., Mathematics, May 2013

Appointments Assistant Professor
University of Minnesota - Twin cities, August 2021 - present

Machine Learning Scientist
Bestbuy, Minneapolis, April 2020 - August 2021

Data Scientist
Houzz, Palo Alto, January 2018 - April 2020

Simons Center for Geometry and Physics
Stony Brook, NY
Research Assistant Professor, September 2017- January 2018

University of California, Los Angeles
Assistant Adjunct Professor, January 2014 - June 2016.

Visiting Fellowships Lebesgue Center
Laboratoire de Mathmatiques Jean Leray
University of Nantes, France
September 2016 - February 2017

Chinese University of Hong Kong
June 2013 - December 2013.

Preprints *From Morse Trees to Pseudo-Holomorphic Discs – Y-Graphs*, joint with Ke Zhu (in progress)

Equivariant Morse homology for Lie group actions, joint with Robi Huq and Shengzhen Ning (in progress)

Invariant and coinvariant Morse homologies for orbifolds, joint with Lina Liu, arXiv:2511.17811 (2025)

Equivariant neural networks and equivarification, joint with Jingcheng Lu, Linqi Song, Nathan Hart-Hodgson, William Parson, Yanheng Zhou, arXiv:1906.07172 (2025)

Equivariant neural networks and equivarification , joint with Jingcheng Lu, Linqi Song, Nathan Hart-Hodgson, William Parson, and Yanheng Zhou, arXiv:1906.07172 (2025)

Equivariant Morse Homology for Reflection Actions via Broken Trajectories, joint with Tyler Lawson and Lina Liu, arXiv:2411.16924 (2024)

Computable, obstructed Morse homology for clean intersections , joint with Ke Zhu, arXiv:2409.11565 (2024)

Morse homology and equivariance, joint with Tyler Lawson, arxiv:2409.04694 (2024).

Publications

Semi-global Kuranishi charts and the definition of contact homology, joint with Ko Honda, Advances in Mathematics (2023).

Coherent orientations in symplectic field theory revisited, Mathematische Zeitschrift, Volume 305, (2023).

Immersed Lagrangian Floer cohomology via pearly trajectories, joint with Garrett Alston, Journal of Geometry and Physics (2021) 169

Equivariant neural networks and equivarification, joint with Linqi Song, arXiv:1906.07172. (2019).

Equivariant Lagrangian Floer cohomology via semi-global Kuranishi structures, joint with Ko Honda, Algebraic and Geometric Topology Volume 21, Issue 4, (2021).

Definition of cylindrical contact homology in dimension three, joint with Ko Honda, Journal of Topology 11 (4), 1002-1053 (2016).

Exact, graded, immersed Lagrangians and Floer theory, joint with Garrett Alston, Journal of Symplectic Geometry, Volume 16, Number 2, arXiv: 1407.3871 (2015).

On Hofer Energy of J-holomorphic Curves for Asymptotically Cylindrical J, Journal of Symplectic Geometry, Volume 14, Number 1, 97D118, 2016, arXiv:1303.4430 (2013).

On J-holomorphic curves in almost complex manifolds with asymptotically cylindrical ends, Pacific Journal of Mathematics, Vol. 278, No. 2 (2015) 291-323.

Holomorphic curves near a point, arXiv:1211.5732 (2012).

Grants

- NSF Conference DMS-2415356, 2024
- NSF Geometric analysis, DMS-2404529, 2024-2027
- AMS Simons Travel Grant, 2015-2017.

Activities Organized

REU program – Equivariant Neural Networks, July, 2025, University of Minnesota.

Yamabe Memorial Symposium, October, 2024, University of Minnesota.

Differential Geometry and Symplectic Topology Seminar, University of Minnesota, Spring 2023 – Fall 2025

AMS special session on Contact Geometry and Low-Dimensional Topology, April 2015 (with Ko Honda and Lenhard Ng).