Daolin Ma

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Education

Ph.D. Mechanics, Dynamics 2009-2015	Peking University Thesis: *Theoretical and Experimental Study of Contact on Interface between Pseudo-Rigid Bodies* Advisor: Caishan Liu Area of study: Contact Mechanics, Friction, and Multibody System Dynamics
B.S. Mechanics 2005-2009	Peking University Thesis: *Experimental Study of Impact into Granular Materials* Advisors: Caishan Liu Areas of study: Theoretical and Applied Mechanics

Experience

Associate Professor 2021-present	Department of Engineering Mechanics, Shanghai Jiaotong University MPI Lab (PI)
Postdoc Fellow/Assoc. 2016-2021	Department of Mechanical Engineering, Massachusetts Institute of Technology MCube Lab, (PI: Alberto Rodriguez)
Assistant Professor 2015-2016	Department of Railway Engineering, Southwest Jiaotong University
Research Assistant 2008-2015	Department of Mechanics, Peking University Dynamical System and Control Lab

Awards, Honors and Grants

ICRA Best Conference Paper Winner – for the submission "Extrinsic Contact Sensing with Relative-Motion Tracking from Distributed Tactile Measurements".	2021
Amazon Robotics Best Systems Paper Award – for the submission "Robotic pick-and-place of novel objects in clutter with multi-affordance grasping and cross-domain image matching".	2018
1st Place Winners – in **Amazon Robotics Challenge (ARC)** Stow Task with the MIT-Princeton team.	2017
[PI] National Natural Science Foundation of China (NSFC) Grant	2017
Chinese Scholarship Council (CSC) Postdoctoral Scholarship	2016
[PI] Menghua Railway Research Grant	2016

Publications

Peer-Reviewed Journal Articles

J14 Bo Wang, Jiaming Xiong, Shuxin Wang, Daolin Ma* and Caishan Liu*. "Steady Motion of Underwater Gliders and Stability Analysis." submitted to *Nonlinear Dynamics* (2021) .

J13 Jun Lai, Jingmang Xu, Ping Wang, Jiayin Chen, Jiasheng Fang, Daolin Ma* and Rong Chen*. "Numerical investigation on the dynamic behavior of derailed railway vehicle protected by guard rail." *Vehicle System Dynamics* (2020) .

J12 Jingyi Xu, Tamay Aykut, Daolin Ma, and Eckehard Steinbach*. "Frictional Contact of Three-dimensional Surface: Modeling and Application." *IEEE Transactions on Robotics* (2020) .

J11 Daolin Ma, and Alberto Rodriguez. "Friction Variability in Planar Pushing Data: Anisotropic Friction and Data-Collection Bias." *IEEE Robotics and Automation Letters*, Vol. 3, No. 4 (2018): 3232-3239.

J10 Boyang An, Daolin Ma, Ping Wang, Jiayi Zhou, Rong Chen, Jingmang Xu*, and Dabin Cui. "Assessing Fast Non-Hertz Methods on Simulation of Wheel-rail Rolling Contact and Wear Distribution." Accepted by *Part F: Journal of Rail and Rapid Transit* (2019).

J9 Andy Zeng*, Shuran Song, Kuan-Ting Yu, Elliott Donlon, Francois Hogan, Maria Bauza, Daolin Ma, Orion Taylor, Melody Liu, Eudald Romo, Nima Fazeli, Ferran Alet, Nikhil Chavan Dafle, Rachel Holladay, Isabella Morona, Prem Qu Nair, Druck Green, Ian Taylor, Weber Liu, Thomas Funkhouser, and Alberto Rodriguez. "Robotic Pick-and-Place of Novel Objects in Clutter with Multi-Affordance Grasping and Cross-Domain Image Matching." *International Journal of Robotics Research* (2019).

J8 Yajie Feng, Wenting Kang, Daolin Ma, and Caishan Liu*. "Multiple Impacts and Multiple-Compression Process in the Dynamics of Granular Chains." *Journal of Computational and Nonlinear Dynamics*, Vol. 14, No. 12 (2019).

J7 Ping Wang, Jian Wang, Xiaochuan Ma, Daolin Ma, Jingmang Xu*, and Yao Qian. "Theoretical 3D Model for Quasistatic Critical Derailment Coefficient of Railway Vehicles and a Simplified Formula." *Mathematical Problems in Engineering* (2018).

J6 Daolin Ma, and Caishan Liu*. "Dynamics of a Spinning Disk." *ASME Journal of Applied Mechanics* Vol. 83, No. 6 (2016): 061003.

J5 Daolin Ma, and Caishan Liu*. "Contact Law and Coefficient of Restitution in Elastoplastic Spheres." *ASME Journal of Applied Mechanics* Vol. 82, No. 12 (2015): 121006.

J4 Daolin Ma, Caishan Liu*, Zhen Zhao, and Hongjian Zhang. "Rolling Friction and Energy Dissipation in a Spinning Disc." *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, Vol. 470, No. 2169 (2014): 20140191.

J3 Jiao Wang, Caishan Liu*, Yan-Bin Jia, and Daolin Ma. "Ratchet Rotation of a 3D Dimer on a Vibrating Plate." *The European Physical Journal E*, Vol. 37, No. 1 (2014).

J2 Zhen Zhao, Caishan Liu*, and Daolin Ma. "Pure Rotation of a Prism on a Ramp." *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, Vol. 470, No. 2169 (2014): 20140007.

J1 Jiao Wang, Caishan Liu*, and Daolin Ma. "Experimental Study of Transport of a Dimer on a Vertically Oscillating Plate." *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, Vol. 470, No. 2171 (2014): 20140439.

Peer-Reviewed Conference Papers

C11 Daolin Ma*, Siyuan Dong, and Alberto Rodriguez. "Extrinsic Contact Sensing with Relative-Motion Tracking from Distributed Tactile Measurements." *International Conference of Robotics and Automation (ICRA)*, 2021. **Best Conference Paper**

C10 Jiaming Xiong, Bo Li, Ruihan Yu, Daolin Ma*, Wei Wang*, Caishan Liu. " Reduced Dynamics and Control for an Autonomous Bicycle." *International Conference of Robotics and Automation (ICRA)*, 2021.

C9 Daolin Ma*#, Elliott Donlon#, Siyuan Dong, and Alberto Rodriguez. "Dense Tactile Force Distribution Estimation using GelSlim and inverse FEM." *International Conference of Robotics and Automation (ICRA)*, 2019.

C8 Siyuan Dong*, Daolin Ma, Elliott Donlon, and Alberto Rodriguez. "Maintaining Grasps within Slipping Bound by Monitoring Incipient Slip." *International Conference of Robotics and Automation (ICRA)*, 2019.

C7 Daolin Ma*, and Alberto Rodriguez. "Friction Variability in Planar Pushing Data: Anisotropic Friction and Data-Collection Bias." *IEEE/RSJ Interational Conference on Intelligent Robots and Systems (IROS)*, 2018.

C6 Daolin Ma*, Chengbo Zhou, and Ping Wang. "A Meso-Scale Dynamic Model For Wheel/Rail Rolling Contact Considering Surface Roughness." *International Conference on Contact Mechanics and Wear of Rail/Wheel Systems (CM)*, 2018.

C5 Boyang An, Ping Wang, Daolin Ma, Jingmang Xu, Rong Chen, Bing Wu, Hongqin Liang. "Elastic-plastic Wheel/Rail Rolling contact Solution at Rail Weld Using a Dyanmic Finite Element Model." *International Conference on Contact Mechanics and Wear of Rail/Wheel Systems (CM)*, 2018.

C4 Andy Zeng*, Shuran Song, Kuan-Ting Yu, Elliott Donlon, Francois Hogan, Maria Bauza, Daolin Ma, Orion Taylor, Melody Liu, Eudald Romo, Nima Fazeli, Ferran Alet, Nikhil Chavan Dafle, Rachel Holladay, Isabella Morona, Prem Qu Nair, Druck Green, Ian Taylor, Weber Liu, Thomas Funkhouser, Alberto Rodriguez. "Robotic Pick-and-Place of Novel Objects in Clutter with Multi-Affordance Grasping and Cross-Domain Image Matching." *International Conference of Robotics and Automation (ICRA)*, 2018. **Amazon Robotics Best Systems Paper Award in Manipulation**.

C3 Daolin Ma*, and Alberto Rodriguez. "How Automated Data-Collection Dynamics Embeds Bias into Dataset." *International Conference on Multibody System Dynamics (IMSD)*, 2018.

C2 Daolin Ma, Caishan Liu*, Xue Chen. "A modified Elastic-Plasticity Constitutive Model for the Impact of Two Balls." *The 3rd Joint International Conference on Multibody System Dynamics and The 7th Asian Conference on Multibody Dynamics (IMSD-ACMD)*, 2014.

C1 Daolin Ma, Caishan Liu*, Hongjian Zhan. Non-contact Measurement of a Disk Spinning on a Table, *ECCOMAS Thematic Conference on Multi-body Dynamics*, 2013.

Chapter in an Edited Book

B1 Ping Wang, Daolin Ma. "Mechanism of Vehicle Derailment." in *10000 Problems in Science*, Beijing: Science Press, *forthcoming*.

Theses

T1 **Daolin Ma** 2015. "Theoretical and Experimental Study of Contact on Interface between Pseudo-Rigid Bodies". Ph.D. thesis, Peking University.

Non-publishing Research Activities

Moon-landing Simulation, China Academy of Space Technology (CAST), Beijing — 2014
Led in developing a software to simulate the dynamics of the docking between two spacecrafts, which was used for evaluating and optimizing catching and docking system design for the Lunar Exploration Project.

Space-Docking Simulation, China Academy of Space Technology (CAST), Beijing — 2011
Led in developing a software system to simulate the dynamics of a spacecraft landing on moon, which was used for evaluating and optimizing landing system design for the Lunar Exploration Project.

Teaching

MIT Kaufman Teaching Certificate Program (KTCP), MIT — 2017
Earned the teaching certificate at MIT.

Advanced Dynamics, Peking University — 2013
Teaching Assistant, earned Best Teaching Awards of Beijing with Prof. Caishan Liu for the project-oriented teaching.

Theoretical Mechanics, Peking University — 2012
Teaching Assistant.

Refereeing: Conferences and Journals

International Journal of Robotics Research (IJRR)
Automatica
Autonomous Robots
Sensors
Chaos
Nonlinear Dynamics
MicroMachines
Journal of Rail and Rapid Transit (JRRT)
Advanced Control for Applications
Sensors and Materials (Guest Editor)
IEEE Robotics and Automation Letters (RAL)
IEEE Transactions on Automation Science and Engineering (T-ASE)
IEEE Transactions on Robotics (T-RO)
Robotics: Science and Systems(RSS)
IEEE International Conference on Robotics and Automation (ICRA)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
IEEE International Conference on Soft Robotics (Robosoft)

Selected Outreach

This list highlights a selection of the many outreach events I have conducted.

Intelligent and Bio-inspired Mechanics Seminar (virtual), Ontario, Canada — 2020
Invited speaker for seminar of the Queen's University of Canada.

iFOSA 2020 (virtual), Beijing, China — 2020
Keynote speaker for conference iFOSA: International Forum on 3D Optical Sensing and Applications.

IROS 2019 Workshop, Macau, China — 2019
Keynote speaker for a full-day workshop on IROS: The current limits and potentials of autonomous assembly.

ICRA 2019 Workshop, Montreal, Canada — 2019
Served as Program Committee member of a full-day workshop on ICRA 2019: High Accuracy Mobile Manipulation in Challenging Environments.

Symposium on Analytical Mechanics, Peking University, Beijing — 2014
Acted organizing a 3-day Symposium on Analytical Mechanics for share and vision of solving real-world problem with analytical mechnics, attended by approximately 100 faculties from around China.