Yang Ding

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Research Interest

Computational Biomechanics, locomotion in complex environments, bio-fluid, bio-inspired robotics, neuromechanical control, granular media.

Current Position

Beijing Computational Science Research Center, Beijing, China *December 2020 - present*

- Associate Professor (Principal Investigator, Tenured)

Previous Positions

Beijing Computational Science Research Center, Beijing, China *May 2014 - December 2020*

- Assistant Professor (Principal Investigator)
- Research Assistant Professor (Principal Investigator)

University of Southern California, Los Angeles, California, USA *Nov 2012 - May 2014*

- Postdoctoral Fellow in the AME department Advisor: Eva Kanso

Georgia Institute of Technology, Atlanta, Georgia, USA *Dec 2011 - Nov 2012*

- Postdoctoral Fellow Advisor: Daniel Goldman

Education

Georgia Institute of Technology, Atlanta, Georgia, USA *Aug 2005 - Dec 2011*

- Ph.D. in Physics Advisor: Daniel I. Goldman,

University of Science and Technology of China, Hefei, Anhui, China *Sep 2001 - Jun 2005*

- B.S. in Physics

Awards

- the Recruitment Program of Global Young Experts, CCCPC, *2015*
- Amelio Fellowship for Excellence in Graduate Research, School of Physics, Georgia Tech *2011*
- SAIC-Georgia Tech Student Paper Competition Award, SAIC-Georgia, *2011*
- Robotics: Science & Systems Best paper award, RSS, *2010*

Publications

Summary: 30 published papers, which include 8 papers on journals with IF¿4: Science(1), PNAS(2), PRL(2), Advanced Materials(1), Plos Computational Biology(2, 2 covers); 2 top conference papers in robotics: RSS(1, Best Paper), ICRA(1), 1 top journal paper in fluid mechanics: JFM(1), Total citation >1000 (Google Scholar).

1. Neng Xia, Bowen Jin, Dongdong Jin, Zhengxin Yang, Chengfeng Pan, Qianqian Wang, Fengtong Ji, Veronica Iacovacci, Carmel Majidi, Yang Ding*, Li Zhang*, Decoupling and Reprogramming the Wiggling Motion of Midge Larvae Using a Soft Robotic Platform, *Advanced Materials* 34(17), 2109126 (2022).
2. Ji Zhang, Kai Liu, and Yang Ding, Speedup of self-propelled helical swimmers in a long cylindrical pipe, *Chinese Physics B* 31 (1), 014702 (2022)
3. Bokai Zhang, Premkumar Leishangthem, Yang Ding*, and Xinliang Xu*, An effective and efficient model of the near-field hydrodynamic interactions for active suspensions of bacteria, *Proceedings of the National Academy of Sciences* 118 (28), e2100145118 (2021)
4. Song, Jialei, Yong Zhong, Ruxu Du, Ling Yin, and Yang Ding Tail shapes lead to different propulsive mechanisms in the body/caudal fin undulation of fish, *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science* 235(2),351-364 (2021).
5. Demir, Ebru, Noah Lordi, Yang Ding*, and On Shun Pak*, Nonlocal shear-thinning effects substantially enhance helical propulsion, *Physical Review Fluids* 5(11) 111301 (2020).
6. Alan C. H. Tsang, Ebru Demir, Yang Ding*, On Shun Pak*, Roads to Smart Artificial Microswimmers, *Advanced Intelligent Systems*, , 2(8): 1900137 (2020).
7. Fengran Xie, Zheng Li, Yang Ding, Yong Zhong, Ruxu Du*, An Experimental Study on the Fish Body Flapping Patterns by Using a Biomimetic Robot Fish, *IEEE Robotics and Automation Letters (RA-L)* 5(1), 64-71 (2019).
8. Tingyu Ming, Bowen Jin, Jialei Song, Haoxiang Luo, Ruxu Du, and Yang Ding*, 3D computational models explain muscle activation patterns and energetic functions of internal structures in fish swimming, *PLoS Computational Biology* 15(9): e1006883 (cover).
9. Wei Wang, Xia Dai, Liang Li, Banti Gheneti, Yang Ding, Junzhi Yu, and Guangming Xie*, Three-Dimensional Modeling of a Fin-Actuated Robotic Fish with Multimodal Swimming, *IEEE Transactions on Mechatronics* 23(4), 1641-1652 (2018).
10. Tingyu Ming and Yang Ding*, Transition and formation of the torque pattern of undulatory locomotion in resistive force dominated media, *Bioinspiration & Biomimetics* 13, 046001(2018).
11. Longhua Zhao, Li Zhang, and Yang Ding*, Analysis of micro-fluidic tweezers in the Stokes regime, *Physics of Fluids*, 30, 032006 (2018) (featured article).
12. Jialei Song, Yong Zhong, Haoxiang Luo, Yang Ding* and Ruxu Du, Hydrodynamics of larval fish quick turning: A computational study, *Proceedings of the Institution of Mechanical Engineers, Part C:Journal of Mechanical Engineering Science* 232(14), 2515-2523 (2017).
13. Zhiwei Peng, Yang Ding*, Kyle Pietrzyk, Gwynn J. Elfring*, and On Shun Pak*, Propulsion via flexible flapping in granular media, *Physical Review E*, 96 (1), 012907 (2017).
14. Yang Ding* and Eva Kanso*, Selective particle capture by asynchronously beating cilia, *Physics of Fluids* 27, 121902 (2015).
15. Hanliang Guo, Janna Nawroth, Yang Ding, Eva Kanso*, Cilia beating patterns are not hydrodynamically optimal, *Physics of Fluids* 26 (9), 091901 (2014).
16. Yang Ding, Janna C. Nawroth, Margaret J. McFall-Ngai and Eva Kanso*, Mixing and transport by ciliary carpets: a numerical study, *Journal of Fluid Mechanics*, 743, 124-140 (2014).
17. Yang Ding, Chen Li, and Daniel I. Goldman*, Swimming in the desert, *Physics Today*, 66(11), 68 (2013).
18. Yang Ding, Sarah S. Sharpe, Kurt Wiesenfeld, and Daniel I. Goldman*, Emergence of the advancing neuromechanical phase in a resistive force dominated medium, *Proceedings of the National Academy of Sciences*, 110(25), 10123 (2013).

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19. Ross Hatton, Yang Ding, Howie Choset, and Daniel I. Goldman*, Geometric visualization of self-propulsion in a complex medium, *Physical Review Letters*, 110, 078101 (2013).
20. Fabricio Q. Potiguar* and Yang Ding, Lift and drag in intruders moving through hydrostatic granular media at high speeds, *Physical Review E*, 88, 012204 (2013).
21. Yang Ding, Sarah S. Sharpe, Andrew Masse, Daniel Goldman*, Mechanics of Undulatory Swimming in a Frictional Fluid, *Plos Computational Biology*, 8(12), e1002810 (2012) (Cover).
22. Sarah S. Sharpe, Yang Ding, and Daniel I. Goldman*, Environmental interaction influences muscle activation strategy during sand-swimming in the sandfish lizard (*Scincus scincus*), *Journal of Experimental Biology*, 216, 260 (2012).
23. Chen Li, Yang Ding, Nick Gravish, Ryan D Maladen, Andrew Masse, Paul B Umbanhowar, Haldun Komsuoglu, Daniel E Koditschek, Daniel I Goldman*, Toward a Terramechanics for Bio-Inspired Locomotion in Granular Environments, *Earth and Space 2012: Engineering, Science, Construction, and Operations in Challenging Environments*, 264-273, 2012
24. Yang Ding, Nick Gravish and Daniel I. Goldman*, Drag induced lift in granular media, *Physical Review Letters*, 106, 028001 (2011).
25. Yang Ding, Nick Gravish, Chen Li, Ryan D. Maladen, Nicole Mazouchova, Sarah S. Sharpe, Paul B. Umbanhowar, and Daniel I. Goldman*, Comparative studies reveal principles of movement on and within granular media, *IMA, Workshop on Locomotion*(2011).
26. Ryan D. Maladen, Paul B. Umbanhowar, Yang Ding, Andrew Masse and Daniel I. Goldman*, Lift control in a sand-swimming robot, *IEEE: International Conference on Robotics and Automation*, (2011).
27. Ryan D. Maladen, Yang Ding, Paul B. Umbanhowar, and Daniel I. Goldman*, Undulatory swimming in sand: experimental and simulation studies of a robotic sandfish, *International Journal of Robotics Research*, (2011).
28. Ryan D. Maladen, Yang Ding, Paul B. Umbanhowar, Adam Kamor, and Daniel I. Goldman*, Mechanical models of sandfish locomotion reveal principles of high performance subsurface sand-swimming, *J. R. Soc. Interface*, 8:1332-1345 (2011) (Cover).
29. Ryan D. Maladen, Yang Ding, Paul B. Umbanhowar, Adam Kamor and Daniel I. Goldman*, Biophysically inspired development of a sand-swimming robot, *Robotics: Science & Systems conference*, (2010).
30. Ryan Maladen, Yang Ding, Chen Li and Daniel I. Goldman*, Undulatory swimming in sand: subsurface locomotion of the sandfish lizard, *Science*, 325, 314 (2009).

Funding

- STCMC 1,000,000 RMB Fluid-dynamics based sensing in swarm robots PI *2020-2021*
- NSFC 560,000 RMB Torque in undulatory locomotion PI *2017-2020*
- STCMC 4,500,000 RMB Legged Robot,participate *2017-2020*
- NSFC-NSAF 33,600,000 RMB Computational Physics, participate *2015-2018*
- STCMC 600,000 RMB Swarm robot control, Co-PI *2017-2018*
- the Recruitment Program of Global Young Experts 3,000,000 RMB *2015*

Teaching

- Lecturer, Advanced Computational Physics, Beijing Normal University *2022 Spring*
- Guest lecturer, Introduction to Biophysics, Beijing Normal University *2017 Fall*
- Guest lecturer, One dimensional unsteady fluid dynamics, Graduate School of CAEP *2018 Fall*
- Teaching assistant, Introductory Physics, Georgia Tech *2005–2008*
- Instructor, hands-on session of a training programe for high school teachers, Georgia Tech *June 2010*

Services

- Reviewer: Nature Physics, Journal of Fluid Mechanics, Physics of Fluids, Proceedings of the Royal Society Interface, PLOS ONE, Scientific Reports, Central European Journal of Physics, Journal of Bionic Engineering, International Conference on Automation Science and Engineering, Climbing and Walking Robots (CLAWAR) meeting.
- Session chair: American Physical Society (APS) DFD meeting 2012; International Conference on Robotics and Automation (ICRA) 2011.
- Judge: Society for Integrative and Comparative Biology Annual Meeting, 2013; Georgia Tech Graduate Research and Innovation Conference, 2012.
- Committee member: International Program Committee of the CLAWAR conference (2014, 2015).

Professional Affiliations

- IEEE TC-BioRobotics China Chapter
- Chinese Physical Society (CPS)
- International Society of Bionic Engineering
- American Physical Society (APS)
- Society for Integrative and Comparative Biology
- Climbing and Walking Robots (CLAWAR) Association