

- I am a lecturer in the Department of Mechanical and Electronic Engineering in School of Mechanical and Automotive Engineering, South China University of Technology and also a permanent research member in the Guangdong Provincial Key Lab. of Precision Equipment and Manufacturing Technology. My research interests include micro fluidic, topology optimization, Metamaterial and compliant mechanisms-based devices used for manipulation and positioning at nanoscale.
- Previously I was a post-doctoral fellow, working in the Division for Microrobotics and Control Engineering (AMiR) at the University of Oldenburg, I worked on Robotic Manipulation, Characterization and Processing on the Nanoscale.
- My PhD research at the South China University of Technology focused on the design of compliant mechanisms used for MEMS by using the level set methods.

EDUCATION

- PhD** School of Mechanical & Automotive Engineering, South China University of Technology, 2009-2014
P.R.China
advised by Prof. ZHANG Xianmin
Thesis: Topology optimization of hinge-free compliant mechanisms using a level set method
- M.S.** School of Mechanical & Automotive Engineering, South China University of Technology, 2008-2009
P.R.China
MD-PhD continuous study.
- B.S.** School of Mechanical Engineering, Shantou University, P.R.China 2004-2008

EXPERIENCE

Employment

- Lecturer** School of Mechanical and Automotive Engineering, South China University of Technology
- Research Staff** Guangdong Provincial Key Lab. of Precision Equipment and Manufacturing Technology 2016–Present
- post-doctoral fellowship** Division for Microrobotics and Control Engineering (AMiR), University of Oldenburg, Oldenburg, Germany 2014–2015
Supervised by Prof. Sergej FATIKOW

Teaching

- 128h per year** Fluid Mechanics
Spring 2017 *for undergraduate students from Department of Mechanical and Electronic Engineering*

AWARDS & HONORS

- 2018 *Pearl River Nova*
Guangzhou Science and Technology Innovation Commission
- 2016 *Best conference paper nomination award*
2016 IFToMM Asian Conference on Mechanism and Machine Science
- 2014 *Sino-German (CSC-DAAD) Postdoc Scholarship*
The China Scholarship Council (CSC);
The Deutscher Akademischer Austausch Dienst (DAAD)
- 2013 *National Graduate Scholarship*
Education Ministry and Finance Ministry, China
- 2013 *Doctoral Innovation Fund (First prize)*
South China University of Technology
- 2012 *National Graduate Scholarship*
Education Ministry and Finance Ministry, China
- 2012 *Doctoral Innovation Fund (Second prize)*
South China University of Technology

LANGUAGES

English Fluent

German *Grundstufe I*, The International Education College of Tong Ji University

PROFESSIONAL ACTIVITIES

- November 2018 *Talk*
2018 Symposium on Fundamental Theory and Applications of Compliant Mechanisms, Guangzhou, China
- October 2018 *Poster Talk*
2018 IUTAM Symposium on When Topology Optimization Meets Additive Manufacturing: Theory and Methods, Dalian, China
- November 2017 *Talk*
2017 ASME's International Mechanical Engineering Congress and Exposition, Tampa, Florida, USA
- July 2017 *Plenary talk*
2017 IEEE International Conference on Manipulation, Automation and Robotics at Small Scales, Montréal, Canada
- December 2016 *Talk*
2016 IFToMM Asian Conference on Mechanism and Machine Science, Guangzhou, China
- August 2013 *Talk*
2013 IEEE International Conference on Manipulation, Manufacturing and Measurement, Suzhou, Jiangsu, China
- December 2012 *Volunteer*
2012 IEEE International Conference on Robotics and Biomimetics, Guangzhou, Guangdong, China

SELECTED PUBLICATIONS

** = corresponding author*

Book

- [1] Zhang, X., and **Zhu, B.** (2018). Topology Optimization of Compliant Mechanisms. Springer, Singapore.

Journal publications

- [1] Zhang, H., **Zhu, B.**, and Zhang, X. (2019). Origami Kaleidocycle-Inspired Symmetric Multi-stable Compliant Mechanisms. *Journal of Mechanisms and Robotics*, 11(1), 011009.
- [2] Li, H., Zhang, X., **Zhu, B.**, and Fatikow, S. (2018). Online precise motion measurement of 3-DOF nanopositioners based on image correlation. *IEEE Transactions on Instrumentation and Measurement*, (99), 1-9.
- [3] Chen, Q., Zhang, X., and **Zhu, B.** (2018). Topology Optimization of Fusiform Muscles with a Maximum Contraction. *International journal for numerical methods in biomedical engineering*.
- [4] Chen, Q., Zhang, X., and **Zhu, B.** (2018). Design of buckling-induced mechanical metamaterials for energy absorption using topology optimization. *Structural and Multidisciplinary Optimization*, 1-16.
- [5] Jin, M., Zhang, X., Yang, Z., and **Zhu, B.** (2018). Jacobian-based topology optimization method using an improved stiffness evaluation. *Journal of Mechanical Design*, 140(1), 011402.
- [6] **Zhu, B.**, Chen, Q., Jin, M., and Zhang, X. (2018). Design of fully decoupled compliant mechanisms with multiple degrees of freedom using topology optimization. *Mechanism and Machine Theory*, 126, 413-428.

- [7] Chen, Q., Zhang, X., and **Zhu, B.** (2018). A 213-line topology optimization code for geometrically nonlinear structures. *Structural and Multidisciplinary Optimization*, 1-17.
- [8] **Zhu, B.**, Chen, Q., Wang, R., and Zhang, X. (2018). Structural Topology Optimization Using a Moving Morphable Component-Based Method Considering Geometrical Nonlinearity. *Journal of Mechanical Design*, 140(8), 081403.
- [9] Tran, A. V., Zhang, X., and **Zhu, B.*** (2018). The development of a new piezoresistive pressure sensor for low pressures. *IEEE Transactions on Industrial Electronics*, 65(8), 6487-6496.
- [10] **Zhu, B.**, Wang, R., Li, H., and Zhang, X. (2018). A Level Set Method With a Bounded Diffusion for Structural Topology Optimization. *Journal of Mechanical Design*, 140(7), 071402.
- [11] Tran, A., Zhang, X., and **Zhu, B.** (2018). Mechanical Structural Design of a Piezoresistive Pressure Sensor for Low-Pressure Measurement: A Computational Analysis by Increases in the Sensor Sensitivity. *Sensors*, 18(7), 2023.
- [12] Zhang, Y., **Zhu, B.***, Wittstock, G., Li, D., Liu, Y., and Zhang, X. (2018). Generating ultra-small droplets based on a double-orifice technique. *Sensors and Actuators B: Chemical*, 255, 2011-2017.
- [13] **Zhu, B.**, Zimmermann, S., Zhang, X., and Fatikow, S. (2017). A systematic method for developing harmonic cantilevers for atomic force microscopy. *Journal of Mechanical Design*, 139(1), 012303.
- [14] Li, H., Zhang, X., **Zhu, B.**, Lu, Y., and Wu, H. (2017). Micro-motion detection of the 3-DOF precision positioning stage based on iterative optimized template matching. *Applied optics*, 56(34), 9435-9443.
- [15] Yao, S., Zhang, X., Yu, J., and **Zhu, B.** (2017). Error modeling and calibration of a 4RRR redundant positioning system. *AIP Advances*, 7(9), 095009.
- [16] **Zhu, B.**, Zhang, X., Zhang, Y., and Fatikow, S. (2017). Design of diaphragm structure for piezoresistive pressure sensor using topology optimization. *Structural and Multidisciplinary Optimization*, 55(1), 317-329.
- [17] Zhang, Y., **Zhu, B.**, Liu, Y., and Wittstock, G. (2016). Hydrodynamic dispensing and electrical manipulation of attolitre droplets. *Nature communications*, 7, 12424.(Equal contribution)
- [18] Li, R., and **Zhu, B.*** (2016). An augmented formulation of distributed compliant mechanism optimization using a level set method. *Advances in Mechanical Engineering*, 8(8), 1687814016664489.
- [19] **Zhu, B.**, Zhang, X., Wang, N., and Fatikow, S. (2016). Optimize heat conduction problem using level set method with a weighting based velocity constructing scheme. *International Journal of Heat and Mass Transfer*, 99, 441-451.
- [20] **Zhu, B.**, Zhang, X., and Fatikow, S. (2015). Filter the shape sensitivity in level set-based topology optimization methods. *Structural and Multidisciplinary Optimization*, 51(5), 1035-1049.
- [21] **Zhu, B.**, Zhang, X., Fatikow, S., and Wang, N. (2015). Bi-directional evolutionary level set method for topology optimization. *Engineering Optimization*, 47(3), 390-406.
- [22] **Zhu, B.**, Zhang, X., and Fatikow, S. (2015). Structural topology and shape optimization using a level set method with distance-suppression scheme. *Computer Methods in Applied Mechanics and Engineering*, 283, 1214-1239.
- [23] **Zhu, B.**, Zhang, X., and Fatikow, S. (2014). A Velocity Predictor–Corrector Scheme in Level Set-Based Topology Optimization to Improve Computational Efficiency. *Journal of Mechanical Design*, 136(9), 091001.
- [24] **Zhu, B.**, Zhang, X., Wang, N., and Fatikow, S. (2014). Topology optimization of hinge-free compliant mechanisms using level set methods. *Engineering Optimization*, 46(5), 580-605.
- [25] **Zhu, B.**, Zhang, X., and Fatikow, S. (2014). Design of single-axis flexure hinges using continuum topology optimization method. *Science China Technological Sciences*, 57(3), 560-567.

- [26] **Zhu, B.**, Zhang, X., and Fatikow, S. (2014). Level set-based topology optimization of hinge-free compliant mechanisms using a two-step elastic modeling method. *Journal of Mechanical Design*, 136(3), 031007.
- [27] **Zhu, B.**, Zhang, X., and Fatikow, S. (2014). A multi-objective method of hinge-free compliant mechanism optimization. *Structural and Multidisciplinary Optimization*, 49(3), 431-440.
- [28] Jin, M., Zhang, X., and **Zhu, B.** (2014). A numerical method for static analysis of pseudo-rigid-body model of compliant mechanisms. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, 228(17), 3170-3177.
- [29] **Zhu, B.**, Zhang, X., and Wang, N. (2013). Topology optimization of hinge-free compliant mechanisms with multiple outputs using level set method. *Structural and Multidisciplinary Optimization*, 47(5), 659-672.
- [30] Jin, M., Zhang, X., **Zhu, B.**, and Wang, N. (2013). Spring-joint method for topology optimization of planar passive compliant mechanisms. *Chinese Journal of Mechanical Engineering*, 26(6), 1063-1072.
- [31] **Zhu, B.**, and Zhang, X. (2012). A new level set method for topology optimization of distributed compliant mechanisms. *International journal for numerical methods in engineering*, 91(8), 843-871.

Conference publications

- [1] Chen, Q., Zhang, X., **Zhu, B.**, Zhang, H., Wang, R., Shi, Y., and Xiong, L. (2018, July). Topology Optimization of Metamaterials for Energy Dissipation. In 2018 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) (pp. 1-6). IEEE.
- [2] Liu, M., Zhan, J., **Zhu, B.**, and Zhang, X. (2018, July). Topology Optimization of Flexure Hinges with Distributed Stress for Flexure-Based Mechanisms. In 2018 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) (pp. 1-5). IEEE.
- [3] Zhang, X., **Zhu, B.**, Wang, R., and Chen, Q. (2018, July). Multistability Analysis for the Compliant Four-Fold Bricard Loops. In 2018 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) (pp. 1-6). IEEE.
- [4] Wang, R., **Zhu, B.**, Zhang, X., Zhang, H., and Chen, Q. (2018, July). Topology Optimization of Compliant Mechanisms Using Moving Morphable Components with Flexure Hinge Characteristic. In 2018 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) (pp. 1-6). IEEE.
- [5] **Zhu, B.**, Lu, Y., Liu, M., Li, H., and Zhang, X. (2017, November). Fatigue Study on the Right Circular Flexure Hinges for Designing Compliant Mechanisms. In ASME 2017 International Mechanical Engineering Congress and Exposition (pp. V04AT05A012-V04AT05A012). American Society of Mechanical Engineers.
- [6] **Zhu, B.**, Liu, M., Chen, Q., Li, H., Zhang, X., and Fu, Y. (2017, July). Topology optimization of the flexure hinges for precision engineering. In Manipulation, Automation and Robotics at Small Scales (MARSS), 2017 International Conference on (pp. 1-5). IEEE.
- [7] **Zhu, B.**, Zhang, X., Fatikow, S., and Liang, J. (2017). Minimizing the Difference Between Two Output Performances to Avoid de Facto Hinges in Topology-Optimized Compliant Mechanisms. In *Mechanism and Machine Science* (pp. 633-643). Springer, Singapore.
- [8] Vang, T. A., Zhang, X., and **Zhu, B.** (2017, November). Design and Optimization of a Highly Sensitive and Linearity Piezoresistive Pressure Sensor Based on a Combination of Cross Beam-Peninsula-Membrane Structure. In ASME 2017 International Mechanical Engineering Congress and Exposition (pp. V010T13A016-V010T13A016). American Society of Mechanical Engineers.
- [9] Li, H., Zhang, X., and **Zhu, B.** (2017, July). Single grid image based calibration of an optical microscope. In Manipulation, Automation and Robotics at Small Scales (MARSS), 2017 International Conference on (pp. 1-6). IEEE.

- [10] Jin, M., Zhang, X., and **Zhu, B.** (2014, August). Design of compliant mechanisms using a pseudo-rigid-body model based topology optimization method. In ASME 2014 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (pp. V05AT08A030-V05AT08A030). American Society of Mechanical Engineers.
- [11] **Zhu, B. L.**, and Zhang, X. M. (2012). Topology optimization of compliant mechanisms using level set method without re-initialization. In Applied Mechanics and Materials (Vol. 130, pp. 3076-3082). Trans Tech Publications.