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Zinan Zhao

Ph.D. Candidate
Engineering Mechanics

Education

- Dec. 2018 **Visiting Ph.D.**, The State University of New Jersey | Rutgers
-Pre. Department of Civil and Environmental Engineering
- Sep. 2014 **Ph.D.** Candidate, Nanjing University of Aeronautics and Astronautics
- Nov. 2018 College of Aerospace Engineering
Thesis: Investigation of Mode-coupled Vibrations in Thin Film Bulk Acoustic Wave Devices with High Performance Based on Frequency Spectrum Quantitative Prediction
- June 2014 **B.E.**, Nanjing University of Aeronautics and Astronautics
Department of Civil and Environmental Engineering

Research Interests

- Model and Mechanical Behaviors of Thin Film Bulk Acoustic Resonators
- Coupled Vibration and Frequency Predictions of FBAR Sensors
- Piezoelectric/piezomagnetic Composites with Magnetoelectric Effect

Honors and Awards

Research Award and Funding

- Sep. 2018 National Scholarship for Graduate Student
- June 2018 China Scholarship Council Grant
- Apr. 2018 Funding of Outstanding Doctoral Dissertation of NUAA (40,000 rmb)
- Oct. 2017 Star Innovation Awards of NUAA
- Sep. 2015 AVIC Special Scholarship
- Sep. 2012 National Scholarship for Undergraduate Student

Best Student Paper Award

- 2015-2017 Symposium of Piezoelectricity, Acoustic Waves and Device Applications, 2015-2017

Conference Travel Award

- April 2019 IEEE International Frequency Control Symposium (IFCS)

Honors

- Sep. 2019 Merit Student of Jiangsu Province
Sep. 2015 Merit Student of Jiangsu Province
Oct. 2015 Second Prize of National Post-Graduate Mathematical Contest in Modeling

Professional Services

- Reviewer IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (TUFFC), Applied Mathematics and Mechanics-English Edition (AMM)
Professional Society Student Member of IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society
Student Member of Jiangsu Mechanical Society

Journal Publications

- Under Review **Frequency shift prediction of a shear mode multi-layered FBAR sensor in viscous media using transfer matrix method**
Z. Zhao, Z. Qian and Y. K. Yong,
Submitted to Applied Mathematical Modeling
- Under Review **Design Considerations for Frequency Shifts in a Laterally Finite FBAR Sensor in Contact with the Newtonian Liquid**
Z. Zhao, B. Wang, Z. Qian, I. Kuznetsova, T. Ma and Y. K. Yong,
Submitted to IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (minor revision).
- 2020 **Lateral size-dependence in UHF mode-coupled ZnO FBARs to suppress undesirable eigen-modes and weaken mounting effect**
Z. Zhao, X. Pang, Z. Qian, I. Kuznetsova, T. Ma and Y. K. Yong,
IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (accepted).
- 2020 **The design of a Frame-Like ZnO FBAR sensor for achieving uniform mass sensitivity distributions**
X. Zhao, Z. Zhao, B. Wang and Z. Qian,
Sensors, vol. 20, no. 8, pp. 2408.
- 2019 **Frequency spectra of coupling vibration in high-frequency thickness-shear ZnO thin film resonator applied in sensing field based on the Hamilton principle**
Z. Zhao, B. Wang, J. Zhu, Z. Qian and B. Huang.
IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, vol. 66, no. 8, pp. 1331-1339.
- 2018 **Mode couplings in high-frequency thickness-extensional vibrations of ZnO thin film resonator based on weak boundary condition**
Z. Zhao, B. Wang, J. Zhu and Z. Qian,
International Journal of Mechanical Sciences, vol. 148, pp. 223-230.
- 2018 **Trapped-energy thickness-extensional mode of a partially electroded ZnO thin-film resonator**
Z. Zhao, B. Wang, Z. Qian and J. Yang,
IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, vol. 65, no. 9, pp. 1669-1679.

- 2017 **Thickness-shear vibration of a z-strip AT-cut quartz crystal plate with nonuniform electrode pairs**
Z. Zhao, Z. Qian and B. Wang,
Ferroelectrics, vol. 506, no. 1, pp. 48-62.
- 2016 **Effects of unequal electrode pairs on an x-strip thickness-shear mode multi-channel quartz crystal microbalance**
Z. Zhao, Z. Qian and B. Wang,
Ultrasonics, vol. 72, pp. 73-79.
- 2016 **Vibration optimization of ZnO thin film bulk acoustic resonator with ring electrodes**
Z. Zhao, Z. Qian and B. Wang,
AIP Advances, vol. 6, no. 4, pp. 045201.
- 2016 **Energy trapping of thickness-extensional modes in thin film bulk acoustic wave filters**
Z. Zhao, Z. Qian and B. Wang,
AIP Advances, vol. 6, no. 1, pp. 015002.
- 2015 **Energy trapping of thickness-extensional modes in thin film bulk acoustic wave resonators**
Z. Zhao, Z. Qian, B. Wang and J. Yang,
Journal of Mechanical Science and Technology, vol. 29, no. 7, pp. 2767-2773.
- 2015 **Analysis of thickness-shear and thickness-twist modes of AT-cut quartz acoustic wave resonator and filter**
Z. Zhao, Z. Qian, B. Wang and J. Yang,
Applied Mathematics and Mechanics-English Edition, , vol. 36, pp. 1527-1538.
- 2015 **Thickness-shear and thickness-twist modes in an AT-cut quartz acoustic wave filter**
Z. Zhao, Z. Qian, B. Wang and J. Yang,
Ultrasonics, vol. 58, pp. 1-5.

Peer-reviewed Conference Publications

- Nov. 2019 **Structural Optimization for Uniform Displacement Variations in ZnO FBAR Mass Sensor Using Rectangular Frame-Like Driving Electrodes**
X. Zhao, **Z. Zhao** and Z. Qian
2019 IEEE Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA), Nov. 2019.
- April 2019 **Effect of Lateral Electrode Size on Suppressing Spurious Modes in ZnO Thin Film Resonators**
Z. Zhao, Z. Qian and Y. K. Yong,
IEEE International Frequency Control Symposium (IFCS), April 2019
- Jan. 2019 **A Homotopy Shape Solution for Thickness-Vibration of Centrally Partially Electroded Regular Polygonal At-Cut Quartz Resonators**
Y. Li, H. Li, **Z. Zhao** and Z. Qian
2018 Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA), Jan. 2019.
- Oct. 2017 **Structural optimization of partially ring-electroded ZnO thin film resonator**
Z. Zhao, B. Wang and Z. Qian
2017 Symposium on Piezoelectricity, Acoustic Waves and Device Applications, Oct. 2017.
Best Student Paper Award

- Oct. 2016 **Thickness-extensional trapped energy vibration of ZnO thin film bulk acoustic wave filters**
Z. Zhao, Z. Qian and B. Wang,
2016 Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA),
Oct. 2016.
Best Student Paper Award
- Oct. 2016 **Advances on Modeling Study of Film Bulk Acoustic Resonators**
Z. Qian, N. Li, **Z. Zhao**, F. Zhu and B. Wang
2016 Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA),
Oct. 2016.
- Nov. 2015 **Analysis of thickness-extensional modes in energy-trapped thin film resonators**
Z. Zhao, Z. Qian, B. Wang and J. Yang,
2015 Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA),
Nov. 2015.
Best Student Paper Award
- Oct. 2014 **An analysis of z-strip at-cut quartz thickness-shear filters**
Z. Zhao, Z. Qian, B. Wang and J. Yang,
2014 Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA),
Oct. 2014.
- Oct. 2014 **An analysis of z-strip AT-cut quartz thickness-shear resonators**
Z. Zhao, Z. Qian, B. Wang and J. Yang,
2014 Symposium on Piezoelectricity, Acoustic Waves and Device Applications (SPAWDA),
Oct. 2014.

References

Prof. Zhenghua Qian

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Prof. Yook-Kong Yong

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