

Zibo Liu

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RESEARCH FIELD, EXPERTISE AND SKILLS

Keywords: “**vibroacoustics; acoustic simulation; acoustic metamaterials/phononic crystal; waves; sound insulation and absorption; sound radiation; structural analysis; finite element method; signal analysis, acoustic measurement; machine learning; phonon**”

Specialized in CAE (FEA) in Acoustics, NVH control and Acoustic Measurement. Interested in exploiting acoustic metamaterials for practical applications and machine learning technology in order to solve real-world problems in different fields of mechanical engineering.

BACKGROUND

MAY 2021 – CURRENT	Postdoctoral researcher in Mechanical Engineering BEIJING, CHINA Department of Mechanical Engineering <i>Tsinghua University</i>
APR. 2019 – APR. 2021	Research Engineer in Acoustics SHANGHAI, CHINA <i>Yi Duo Information Technology Co., Ltd. (Shanghai) & Institute of Acoustics, Tongji University</i>
SEP. 2014 – MAR. 2019	PhD in Acoustics STOCKHOLM, SWEDEN Department of Aeronautical and Vehicle Engineering <i>KTH Royal Institute of Technology</i>
SEP. 2011 – JUN. 2014	Master of Science in Acoustics CHANGSHA, CHINA Theoretical Acoustics <i>National University of Defense Technology</i>
SEP. 2007 – JUN. 2011	Bachelor of Engineering & Bachelor of Business Administration BEIJING, CHINA Applied Mechanics & Business administration <i>Beijing Institute of Technology</i>

SCIENTIFIC PAPERS

- Liu, Z.**, Rumpler, R. and Feng, L., 2021. Locally resonant metamaterial curved double wall to improve sound insulation at the ring frequency and mass-spring-mass resonance. *Mechanical Systems and Signal Processing*, 149, p.107179. doi: 10.1016/j.ymssp.2020.107179
- Liu, Z.**, Rumpler, R. and Feng, L., 2019. Investigation on sound transmission through a locally resonant metamaterial cylindrical shell. *Journal of Applied Physics*, 125, 115105(2019). doi: 10.1063/1.5081134
- Song, Y., Feng, L., **Liu, Z.**, Wen, J. and Yu, D., 2019. Suppression of the vibration and sound radiation of a sandwich plate via periodic design. *International Journal of Mechanical Sciences*, 150, pp.744-754. doi: 10.1016/j.ijmecsci.2018.10.055
- Liu, Z.**, Rumpler, R. and Feng, L., 2018. Broadband locally resonant metamaterial sandwich plate for improved noise insulation in the coincidence region. *Composite Structures*, 200, pp.165-172. doi: 10.1016/j.compstruct.2018.05.033
- ***Liu, Z.**, *et al*, 2021. Theoretical and experimental study of sound insertion loss of a multilayer pipeline jacket.
- ***Liu, Z.**, *et al*, 2021. Improve the sound transmission loss of curved sandwich panel by simultaneously overcoming the ring frequency and coincidence effects.

* to be submitted

CERTIFICATE

NAME **Machine Learning**
ISSUED ON May 18th, 2021
CERTIFICATE X87UF4TPTLHV, *an online non-credit course authorized by Stanford University and offered through Coursera*

OPEN-SOURCE CODE

NAME **STransLAMP**
LAST UPDATED ON May 18th, 2021, [GITHUB.COM/ZIBO-KTH/STRANSLAMP](https://github.com/ZIBO-KTH/STRANSLAMP)
DESCRIPTION *Estimation of Sound Transmission Loss of Acoustic Metamaterial Panels*

NAME **SooMa**
LAST UPDATED ON May 18th, 2021, [GITHUB.COM/ZIBO-KTH/SOOMA](https://github.com/ZIBO-KTH/SOOMA)
DESCRIPTION *Estimation of Sound Insertion Loss of a Multilayer Pipeline Jacket System*

DETAILED WORK EXPERIENCE

Department of Mechanical Engineering, Tsinghua University, Beijing, China
Postdoctoral researcher MAY 2021, CURRENT (FULL TIME, 100%)
Responsibilities include: *i*, Conducting research on the phonon properties of nanostructures. The objective is to investigate the energy dissipation mechanism via phonons, and realize the tuning of nanofriction properties for tailored 2D materials based on phonon engineering. *ii*, Leading weekly group discussions and co-advising junior postgraduate students.

School of Materials, Sun Yat-sen University, Guangzhou, China
External researcher SEP. 2020, APR. 2021 (PART TIME, 20%)
Research on developing new application of acoustic metamaterials.

Department of Mechanical Engineering, Tsinghua University, Beijing, China
External researcher JUL. 2020, APR. 2021 (PART TIME, 20%)
Tribological behaviour of a diesel engine and engine sealing project.

Institute of Acoustics, Tongji University, Shanghai, China
Research engineer DEC. 2019, APR. 2021 (PART TIME, 20%)
Modeling the sound insulation performance of the multilayer systems.

Yi Duo Information Technology Co., Ltd. (Shanghai), Shanghai, China
Senior acoustic consultant, Project manager JUL. 2019, JAN. 2021 (FULL TIME, 80%)
Develop pipeline jackets for nuclear power plant in order to achieve integrated function of thermal insulation and noise reduction as a part of the National Major Project Research of China.

KTH Royal Institute of Technology, Stockholm, Sweden
Research engineer DEC. 2018 – JUN. 2019 (PART TIME, 50%)
Study the acoustic properties of metamaterials to develop applications in sound insulation engineering; laboratory assistant at Marcus Wallenberg Laboratory for Sound and Vibration Research(MWL).

DETAILED PROJECT EXPERIENCE

Atomic design for nanofriction control
Department of Mechanical Engineering, Tsinghua University MAY 2021 – CURRENT
To understand the physical mechanisms for the origin of friction, and exploit the potential methods for controlling friction properties of the materials is one of the cutting-edge challenges for the sustainable society development. Fundamental knowledge for controlling the

nanofriction is to understand the energy dissipation mechanism, where phonon may play a key role, forms the topic of the current study.

SEP. 2020 – APR. 2021

Research on developing new applications of acoustic metamaterials

School of Materials Sun Yat-sen University

Research on the exploitation of acoustic metamaterial applications.

JUL. 2020 – APR. 2021

Tribological behaviour of a diesel engine

Weichai Power Co., Ltd & State Key Laboratory of Tribology, Tsinghua University

Improve the tribological behaviour of a diesel engine by improving its sealing performance.

JUN. 2019 – JAN. 2021

Research on the Noise and Vibration Control of the Pipelines for Nuclear Power Plant

National Science and Technology Major Project. Yi Duo Co., Ltd.; Tongji University & Shanghai Nuclear Engineering Research and Design Institute

NVH control of the pipeline for the nuclear power plant. This project is a part of the National Science and Technology Major Project, under the Project Number ZDo8-212-002-002, funded by China Innovation Funding.

DEC. 2018 – JUN. 2019

Acoustic metamaterials

MWL, AVE, KTH

Investigations on the properties of acoustic metamaterials in order to develop more applications for practical engineering.

SEP. 2016 – MAR. 2019

Design of soundproof panels via metamaterial concept

PhD research project at MWL, AVE, KTH

Investigation on the acoustic properties of metamaterial panels, especially with the application to sound insulation.

OCT. 2018 – FEB. 2019

Analysis and design of sandwich structures

Lightweight structures group, AVE, KTH

The project aims at investigating and improving the sound transmission loss properties of sandwich structures. A solution is proposed to the coincidence effect of sandwich structures.

SEP. 2016 – MAR. 2017

Roll2Rail Project

Hitachi Rail Italy & MWL, AVE, KTH

The Roll2Rail project aims to develop key technologies for radical innovation in the field of railway vehicles. As part of this project, Zibo simulated the sound transmission loss property of the cabin of a train under the supervision of Dr. Roman Rumpler.

SEP. 2015 – JAN. 2016

Acoustic properties of porous materials

MWL, AVE, KTH

The project aims to study the acoustic properties of porous materials. Biot's theory was studied through the project. A theoretical basis for the core design of the further sandwich structure is provided.

JAN. 2015 – MAY 2015

Structural analysis of GKN driveline

GKN Driveline & MWL, AVE, KTH

The modal analysis of a GKN driveline was carried out. Eigenmodes and eigenfrequencies are predicted theoretically and then tested experimentally.

CONFERENCES

2021 JUL. 11-16 ICSV 27, virtually held by IIAV
Oral presentation & published paper

- Design of curved sandwich panels to overcome the ring frequency and coincidence effects
- 2021 JUN. 24th International Conference on Composite Structures, virtually held University of Porto, Portugal,
Oral presentation
Curved double wall with embedded resonators to improve the sound transmission loss
- 2018 JUL. ICSV 25, Hiroshima, Japan
Oral presentation & published paper
Investigation on the acoustic behaviour of the locally resonant metamaterial curved panel
- 2017 JUN. Acoustics'17, Boston, Massachusetts
Oral presentation & published abstract
Design of broadband acoustic metamaterials for low-frequency noise insulation *JASA*, 141(5), pp.3574-3574.
- 2016 JUN. BNAM 2016, Stockholm, Sweden
Oral presentation & published paper
A finite element model for the vibro-acoustic analysis of plates and sandwich structures
- 2014 DEC. SAPEM 2014, Stockholm, Sweden
Attendance & organizing committee

SEMINARS & LECTURES

- 2019 FEB. AVE KTH, Stockholm, Sweden
Lecture on the acoustic properties of sandwich
- 2018 DEC. ABB, Västerås, Sweden
Introduction to the acoustic metamaterial
- 2017 DEC. MWL Annual, Stockholm, Sweden
Introduction to the research progress
- 2017 DEC. AVE Department Seminar, Stockholm, Sweden
Metamaterial sandwich plate for noise insulation
- 2016 DEC. MWL Annual, Vaxholm, Sweden
Introduction to the research progress
- 2015 DEC. Bombardier Transportation, Västerås, Sweden
Introduction to the research on sound insulation

AWARDS

- 2014 **CSC Scholarship**
China Scholarship Council
- 2011 **Excellent Graduate**
Beijing Institute of Technology

INTERESTS

a) Engineering mathematics and physics; b) Computer science, machine learning; c) Historical and political books/talks; d) Piano, Running.

REFERENCES

- Dr. Leping Feng** (principal supervisor)
- POSITION Associate Professor
- EMPLOYER Department of Aeronautical and Vehicle Engineering
KTH Royal Institute of Technology
- EMAIL fengl@kth.se

Dr. Romain Rumpler (co-supervisor)

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Dr. Qi Li

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Dr. Wuzhou Yu

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EMAIL ywzh@tongji.edu.cn

Dr. Dameng Liu

POSITION Associate Professor
EMPLOYER Department of Mechanical Engineering, Tsinghua University

Dr. Bin Li

POSITION Professor, Dean of School of Materials, SYSU
EMPLOYER School of Materials, Sun Yat-sen University