LI ZHENKUN ⓘ , MASTER OF SCIENCE   CURRICULUM VITAE

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PERSONAL SUMMARY

- M. Sc. in Structural Engineering (Smart Materials and Structures);
- Interests: Structural health monitoring, system identification, damage detection, machine learning, computer vision.
- Strengths: math calculation, FE analysis, computer programming, time/frequency-domain signal analysis, data processing.

EDUCATION

09/2017-06/2020   **Master of Engineering (M. Sc.),** Structural Engineering, GPA: 3.76/4.0.
Faculty of Infrastructure of Engineering, Dalian University of Technology (DUT), Dalian, China.
Main curriculum: Optimization method(97), Matrix and Numerical Analysis(96), Finite element method and its application(89), Random vibration(90), Structural health monitoring and damage diagnosis(90), Structural Dynamics (77), Earthquake engineering(94.5), Modern experimental mechanics(88).
Thesis topic: *Additional Virtual Mass Damage Identification Method Based on Narrow Band Frequency Responses* (in Chinese, awarded with distinction).

09/2013-06/2017   **Bachelor of Engineering (B. Sc.),** Civil Engineering, GPA: 86.03/100.
School of Civil Engineering, Qingdao University of Technology (QUT), Qingdao, China.
Main curriculum: Programming basis (94), Calculus(92), Linear algebra(90), Probability theory and mathematical Statistics(90), Structural mechanics(97), Soil mechanics(94), Material mechanics(87), Concrete structure design principle(88), Basic principle of steel structure(95), Bridge engineering(83).
Diploma thesis: *Architecture and structural design of HOTEL SWAN LAKE at Changdao* (in Chinese).

WORK EXPERIENCE

04/2021-present   **Beijing Smartbow Information Technology Co., Ltd., Beijing, China. Structural Algorithm Engineer**
The company's main task is to monitor the health condition of infrastructures(including bridges, wind turbines, tunnels, etc.) online. I am responsible for develop algorithms for outlier data handling, structural modal parameters analysis, and structural dynamic response analysis using Python and MATLAB.

07/2020-03/2021   **TCDRI, Sinoma International Co., Ltd., Tianjin, China, Structural Engineer.**
The company's main task is developing smart BIM intelligent platform in cement industry construction, structural design, cement manufacture process design, etc. It takes overall responsibility of projects. I am responsible for structural design using PKPM, YJK, Midas building software and AutoCAD, Revit development (using C#), and self-used programs improvement (using Fortran).

09/2017-06/2019   **DUT, Dalian, China, Teaching Assistant (TA).**
Fall 2017, 2018: TA for the graduate course Prestressed Structures at the Department of Civil Engineering at DUT. I am responsible for Q&A, homework correction and score registration.
Spring 2018, 2019: TA for the undergraduate course Matlab in Engineering at the Department of Civil Engineering at DUT. I am responsible for Q&A, program debugging and score registration.

09/2017-06/2019   **DUT, Dalian, China, Research Assistant (RA).**
Fall 2017-Fall 2019: RA for funded projects of my tutor Prof. Hou. I am responsible for simple steel structure design in Lab, operating machines (e.g. crane), sensor placement, preliminary data processing, etc.

RESEARCH & PROFESSIONAL EXPERIENCES

- National Natural Science Foundation of China (NSFC), grant number 51878118, Structural damage identification and experiment study of slab track based on adding virtual physical parameters, 01/2019-12/2022, 680,000 RMB, ongoing, as main student investigator.
(1) Built the FE coupling model of CRTS II rails, track and foundation(elements of solid 45, combine 14 and beam 188);
(2) Designed the simple harmonic excitation exciter: a. Built machine's 3-D model in SOLIDWORKS (pic.) . b. Monitored the manufacture of the machine in industry (video). c. Debugged the machine according to experiments in the Lab.;
(3) Added the machine to the Lab structure(e.g. the cantilever beam, rails), and performed damage detection.
- Health monitoring of the Xinghai Bridge's suspension cable, 07-09/2018, as investigator. (pic.)
(1) Designed the additional mass(circular mass that can attach to the cable) and manufacture it in industry;
(2) On-site experiments with colleagues, including adding the mass to the suspension cable of the bridge, knocking at the cable exactly at the additional mass position using modal hammer, and data collection using sensors and LabVIEW;
(3) Signal processing using MATLAB, including time-domain and frequency-domain analysis.
- Numerical simulation of damage identification of Dongying large-span bridge, 09-12/2018. (pic.)
(1) FE model building using ANSYS (using elements of solid 45, beam188 and combine14, etc.);
(2) Extracted mass and stiffness matrixes from ANSYS to perform modal analysis;

(3) Added the virtual mass (500 ton) to the bridge to improve its sensitivity to damage.
- Damage detection of the plane frame structure, 03-07/2018. (pic.)
  (1) Designed the plane frame structure (height, cross-section width & thickness, artificial incision);
  (2) Built the FE model using MATLAB and updated the model according to modal information (natural frequency, etc.);
  (3) Verified the mass estimation method, frequency-based Bayesian method, and additional mass-based objective function.
- Study on mechanical properties of SMA-rolling disc spring isolation bearing, 06/2014-09/2015, 3000RMB,as leader. (video)
  (1) leaded a 7-person team to apply for 1-year fund from QUT, communicating with Prof. Sui to arrange research work;
  (2) Conducted data processing using MATLAB and responsible for designing the experiment;
  (3) Gave presentation to show the whole experimental process and results (Graded No.1 in all groups);
  (4) Wrote project reports to take part in province and national competition. (2nd prize in Province and 3rd prize in Nation).
- National Mathematical modeling competition, Positional calculation technology based on the sun shadow, 07/2015.(paper)
  (1) Derived calculus according to the change of a pole's shadow length and the sun's position from recorded video;
  (2) Programed using MATLAB to calculate the exact position(longitude & latitude) of the pole on the earth;
  (3) Paper writing and formatting. (Second prize in nation and one publication on peer-reviewed journal)

PROFESSIONAL COMPETENCE & CERTIFICATES

- Mastered language: English(TOEFL 105; GRE 320+3.5), Chinese (mother tongue); Basic: Spanish.
- Machine learning(in *Coursera*: taught by Andrew Ng); Deep learning (book, written by Ian Goodfellow et al.)
- National Computer Rank Examination Certificate of Level 2 (C programming language).
- National Computer Rank Examination Certificate of Level 3 (Internet technology).
- National 1st Class Certified Structural Engineer.
- National Certificate of BIM Skill Proficiency Test Level 1.
- Main Software: Computing: MATLAB | Languages: Python, C, C++ | Numerical simulation: ANSYS, Abaqus, SAP2000 | Modeling: SOLIDWORKS, Revit | Text processing: MS Office, LaTeX, HTML5+CSS3 | Figures: OriginLab, Photoshop.

PUBLICATIONS

(1) Hou, J. (supervisor), **Li, Z.**, Zhang, Q., Jankowski, Ł and Zhang, H. (2020) Local mass addition and data fusion for structural damage identification using approximate models, *International Journal of Structural Stability and Dynamics*. DOI: 10.1142/S0219455420501242 [CrossRef] **(Article paper, SCI indexed)**

(2) Hou, J. (supervisor), **Li, Z.**, Jankowski, Ł. and Wang, S. (2020). Estimation of virtual masses for structural damage identification. *Structural Control and Health Monitoring*, e2585. DOI: 10.1002/stc.2585[CrossRef] **(Article paper, SCI indexed)**

(3) Hou, J. (supervisor), **Li, Z.**, Zhang, Q., Zhou, R., and Jankowski, Ł. (2019). Optimal Placement of Virtual Masses for Structural Damage Identification. *Sensors,* 19(2), 340. DOI: 10.3390/s19020340 [CrossRef] **(Article paper, SCI indexed)**

(4) **Li, Z.**, Hou, J. (supervisor), Ł. Jankowski, Structural damage identification based on estimated additional virtual masses and Bayesian theory, *Structural Health Monitoring*. Under review.

(5) Yuan Y., **Li, Z.**, Ge Z., Wang, J. and Fan, X. (2016) Positional calculation technology based on the sun shadow, *Journal of Guizhou Normal University (Natural Sciences)*, 34(5), 88-92. DOI: 10.16614/j.cnki.issn1004-5570.2016.05.016 [CrossRef]

SELECTED AWARDS & HONOURS

Jun. 2020	Excellent master thesis	DUT
Jun. 2020	Eminent graduate in Liaoning Province	Liaoning Province
Nov. 2019	Scholarship of Chinese Road and Bridge	DUT
Oct. 2018	Eminent postgraduate student	DUT
Oct. 2016	Scholarship from Shandong Province Government (only 1 among 508 students)	Shandong Province
Dec. 2015	Second Prize in National Mathematic Modeling Competition	National level
Nov. 2015	Third Prize in the National Advanced Innovated Competition	National level
Jun. 2015	Second Prize in the 14th Challenge Cup Competition in Shandong Province	Shandong Province
Nov. 2014	Scholarships from Principal of QUT (only 4 in 508 students)	QUT

COMMUNICATION & CONFERENCE

- Academic communication at Osaka University and Kyoto University on Jan. 7-15, 2020, Osaka, Japan. (pic.)
  Gave a key presentation of my work: additional mass method and mass estimation according to target frequency.
- International conference: Experimental Vibration Analysis for Civil Engineering Structures (EVACES 2019) on Sep. 5-8, 2019, Nanjing, Jiangsu, China. Sponsor: Southeast University. (pic.)
  Communicated with Prof. Satish Nagarajaiah (Rice University, USA), Prof. Jinping Ou (Harbin Institute of Technology, China), Prof. Hui Li(Harbin Institute of Technology, China), Prof. Hong Hao (Curtin University, Australia), Prof. Aleksandar Pavic (The University of Exeter, UK), Prof. Yong Lu (The University of Edinburgh, UK).
- International conference: 7th World Conference on Structural Control and Monitoring (7WCSCM), on Jul. 22-25, 2018, Qingdao, Shandong, China. Sponsor: Harbin Institute of Technology & Qingdao University of Technology. (pic.)
  Communicated with Prof. Billie F. Spencer (University of Illinois at Urbana-Champaign, USA), Prof. Yozo Fujino (University of Tokyo, Japan), Prof. Jinping Ou (Harbin Institute of Technology, China), Prof. Łukasz Jankowski(Institute of Fundamental Technological Research (IPPT PAN), Polish Academy of Sciences, Warsaw, Poland).