Curriculum Vitae of Dr Wang Jiaji

(i) Name: Wang Jiaji

(ii) Academic qualifications: Ph.D. (civil engineering)

(iii) Previous academic positions held (with dates):

2010.07.01-2014.08.01: B.S. in Civil Engineering, Tsinghua University, China

2014.07.01-2019.07.01: Ph.D. in Civil Engineering Mentored by Prof. Jianguo Nie (member of Chinese Academy of Engineering);

2017.07.16-2017.10.16: visiting scholar at Northeastern University Mentored by Prof. Jerome F. Hajjar (member of U.S. National Academy of Engineering)

2019.07.09-2021.04.21: Postdoctoral researcher at the University of Houston

2022.04.21-2022.11.03: JSPS postdoctoral fellow at Kyoto University

(iv) Present academic position: Assistant Professor at the University of Hong Kong

(v) Previous relevant research work:

1) Developing physics-informed machine learning algorithms for efficient simulation of engineering structures to achieve rapid model updating of engineering structures and to optimize the design of structures using GPU accelerators and supercomputers. This study proposed an **E**xact **D**isplacement Boundary **P**hysics-**i**nformed **N**eural **N**etwork (EPINN) framework, which achieved more than 127 times speed-up compared to conventional Physics-informed Neural Network (PINN). EPINN adopts the exact Dirichlet boundary condition and principle of least work for the simulation of solid mechanics problems.

2) Developing a Vehicle-bridge Interaction Neural Operator (VINO) to serve as the digital twin of bridge structures. VINO is developed based on Fourier Neural Operator (FNO) architecture and learns the forward and inverse mappings between structural response fields and damage fields. Pre-trained VINO achieved structural simulation and health monitoring with more than 10 times speed-up compared to FE model updating.

3) Developing high-fidelity constitutive models for elaborate simulation and design of steel and composite structures. The PI developed an ABAQUS constitutive model for elaborate simulation of engineering structures, including uniaxial, biaxial, and triaxial models. The PI also developed a novel Temporal Convolutional Network (TCN) to learn the nonlinear constitutive model from the FE simulation dataset of steel and concrete material. TCN achieved more than 10 times speedup compared to stress updating algorithms in the ABAQUS FE solver.

4) Experimental study and simulation of RC structures and steel-concrete composite structures under complicated loads: The PI completed an experimental and numerical study of 30 shear walls and 20 composite beams under complicated loads. More than 2,000 nonlinear parametric finite element simulations were conducted.

5) Metamaterial-based foundations and barriers for seismic isolation: PI conducted an experimental study on the wave isolation performance of metamaterial systems.

As the first or corresponding author, Dr. Wang published 35 SCI papers, including leading journals such as Engineering Structures, Computer Methods in Applied Mechanics and Engineering, and Journal of Computational Physics. PI's Web of Science citation is 480 with an H-index of 15 and the Google Scholar citation is 669. PI has been awarded the JSPS Postdoctoral Fellowship and led a usage course in the world's No. 2 supercomputer Fugaku. Dr. Wang has also been awarded the 2019 LIU Huixian Earthquake Engineering Fellowship, Scientific and Technological Outstanding Award 2019 by China Steel Construction Society, and Outstanding PhD of Beijing.

Publication record

Section A - Five most representative publications in the last five years

1. **Jia-Ji Wang**, Y.L. Mo, Bassam Izzuddin, Chul-Woo Kim. (2023) Exact Dirichlet boundary Physics-informed Neural Network EPINN for solid mechanics, Computer Methods in Applied Mechanics and Engineering. 414, 116184.
2. **Jia-Ji Wang**, Chen Wang, Jian-Sheng Fan, Y. L. Mo. (2022): A deep learning framework for constitutive modeling based on Temporal Convolutional Network. Journal of Computational Physics, 449, 110784.
3. **Jia-Ji Wang**, Yu-Fei Liu, Xin Nie, Y. L. Mo. (2021): Deep convolutional neural networks for semantic segmentation of cracks. Structural Control and Health Monitoring, e2850.
4. **Jia-Ji Wang**, Cheng Liu, Xin Nie, Jian-Sheng Fan, Ying-Jie Zhu. (2021): Nonlinear model updating algorithm for biaxial reinforced concrete constitutive models of shear walls, Journal of Building Engineering, 44, 103215.
5. **Jia-Ji Wang**, Cheng Liu, Jiansheng Fan, Jerome F. Hajjar, Xin Nie. (2019): Triaxial concrete constitutive model for simulation of composite plate shear wall-concrete encased: THUC3. ASCE Journal of Structural Engineering. 145(9): 04019088.

Section B – Five representative publications beyond the recent five-year period

1. **Jia-Ji Wang**, Meng Zhou, Jiansheng Fan, Muxuan Tao. (2018): Simplified Design Method for the shear capacity of steel plate shear-strengthened reinforced-concrete beams, ASCE Journal of Bridge Engineering, 23(11): 1-13.
2. **Jia-Ji Wang**, Mu-Xuan Tao, Jian-Sheng Fan, Xin Nie. (2018): Seismic behavior of steel plate reinforced concrete composite shear walls under tension-bending-shear combined cyclic load. Journal of Structural Engineering, 144(7), 04018075.
3. Jian-Guo Nie, **Jia-Ji Wang**, Shuang-Ke Gou, Yao-Yu Zhu, Jian-Sheng Fan. (2018): Technological development and engineering applications of novel steel-concrete composite structures. Frontiers of Structural and Civil Engineering, 13: 1-14.
4. **Jia-Ji Wang**, Mu-Xuan Tao, Meng Zhou, Xin Nie. (2018): Force transfer mechanism in RC beams strengthened in shear by means of steel plated concrete, Engineering Structures, 171, 56-71.
5. **Jia-Ji Wang**, Mu-Xuan Tao, Xin Nie. (2017): Fracture energy-based model for average crack spacing of reinforced concrete considering size effect and concrete strength variation. Construction and Building Materials, 148, 398-410.