YONGZHONG LI

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Education

- ***University of Toronto (UofT)*** — Ontario, Canada
  Electrical and Computer Engineering (Electromagnetics) — *MASc. 2021-2023(expected)*
  ***Cumulative GPA**: 4.0/4.0*
  ***Key Coursework:** Integral Equation Methods for the Numerical Solution of PDEs (A+), Scientific Computing (A+), Electromagnetic Theory (A+), Modeling of Multiphysics System (A), Machine Learning (A)*
- ***Beihang University (BUAA)*** — Beijing, China
  Electronic Information Engineering — *B.S. 2016-2020*
  Bachelor Thesis in Computational Electromagnetics
  - *Outstanding Bachelor Thesis Award (5/339)*
  - *College Graduate Excellence Award*

Research Interests

- **Primary**: Modeling and simulating physical systems at different scales by integrating numerical methods (boundary element method, finite difference method) and machine learning techniques, with particular interests in solving Maxwell's equation in complex geometries.
- **Application**: Modeling of 3D integrated circuits, non-destructive testing of acoustic system, scattering analysis of nanophotonic structure.

Research Experience

- **University of Toronto** — Ontario, Canada
  Graduate Student - Supervisor: Prof. Piero Triverio — *Sep 2021 - Present*
  - Developed a multigrid boundary element method for solving Maxwell equations.
  - Collaborating with AMD to deploy the built method in large-scale IC design.
- **Hong Kong University of Science and Technology** — Hong Kong, China
  Research Assistant - Supervisor: Prof. Jensen Li — *Sep 2020 - Sep 2021*
  - Proposed a variational framework (bata-VAE) to extract interpretable physical concepts from wave propagation data.
  - Applied the proposed technique to the inverse imaging (structural and material properties) of elastic wave system.
- **Beihang University** — Beijing, China
  Research Assistant - Supervisor: Prof. Qiang Ren — *May 2018 - Aug 2020*
  - Applied Finite Difference Frequency Domain method (FDFD) to simulate both 2D and 3D EM scattering.
  - Proposed a neural network-based (U-net) surrogate solver to accelerate FDFD simulation of isolated nanophotonic structures.
- **University of California, Los Angeles** — Los Angeles, United States
  Visiting Student - Mentor: Prof. Jun Chen — *July 2019 - October 2019*
  - Reviewed the textile-based wearable electronics for energy harvesting in the ambient environment.
  - Improved the efficiency of on-body bio-mechanical energy harvesters by exploiting triboelectric and electromagnetic effect.

Book

Qiang Ren*, Yinpeng Wang, **Yongzhong Li**, Shutong Qi, Sophisticated Electromagnetic Forward Scattering Solver via Deep Learning, **Springer**, Singapore, 2022

Journal (Chronologically)

Yongzhong Li, Jiawei Xi, Leung Ka Wun Casey, Tan Li, Wing Yim Tam, Jensen Li*, Imaging by Unsupervised Feature Learning of Wave Equation, **Physical Review Applied**, 2021, 16(6): 064039.

Yongzhong Li, Yinpeng Wang, Shutong Qi, Qiang Ren*, Lei Kang, Sawyer D. Campbell, Ping Werner, Douglas H. Werner, Prediction scattering from complex nano-structure's via deep learning, **IEEE Access**, 8: 139983 - 139993 (2020)

Guorui Chen, **Yongzhong Li**, Bick Michael, Jun Chen* Smart textile for electricity generation, (Front Main Cover), **Chemical Review** (IF: 54.3), 120(8), 3668 - 3720 (2020)

Shutong Qi, Yinpeng Wang,**Yongzhong Li**, Xuan Wu, Qiang Ren*, Ren Yi, 2D Electromagnetic Solver Based on Deep Learning Technique, **IEEE Journal on Multiscale and Multiphysics Computational Techniques**, 5,83-88 (2020)

Nannan Zhang†, Fang Huang†, Shenlong Zhao, Xinghao Lv, Yihao Zhou, Siwei Xiang, Shumao Xu, **Yongzhong Li**, Guorui Chen, Changyuan Tao, Yi Nie*, Jun Chen*, Xing Fan* Photo-Rechargeable Fabrics as Sustainable and Robust Power Sources for Wearable Bioelectronics, **Matter (Cell Press)**, 2(5), 1260-1269 (2019)

Cheng Yan, Yuyu Gao, Shenlong Zhao, Songlin Zhang, Yihao Zhou, Weili Deng*, Ziwei Lia, Gang Jianga, Long Jin, Guo Tian, Tao Yang, Xiang Chu, Da Xiong, Zixing Wang, **Yongzhong Li**, Weiqing Yang*, Jun Chen* A Linear-to-Rotary Hybrid Nanogenerator for High-Performance on Body Biomechanical Energy Harvesting, **Nano energy** (IF: 15.4), 67, 104235 (2019)

Conference

Jiawei Xi, **Yongzhong Li**, Jensen Li*, Acoustic imaging assisted by unsupervised learning, 12th International Conference on Metamaterials, Photonic Crystals and Plasmonics, Spain, 2022

Yinpeng Wang, **Yongzhong Li**, Shutong Qi, Qiang Ren* Electromagnetic Scattering Solver for Metal Nanostructure via Deep Learning, **PIERS, Best Student Paper 3rd Prize**, Hangzhou, 2021

Honors and Awards

- 2021, 2022 Edward S. Rogers Sr. Graduate Scholarships, University of Toronto
- 2020 Redbird Fellowship, HKUST
- 2019 **&** 2018 Innovation Scholarship for Undergraduate Students **First Prize**
- 2019 Innovation Scholarship for Undergraduate Students **First Prize**
- 2019 Academic Scholarship for Undergraduate Students **Second Prize**
- 2018 COMAPs Mathematical Contest in Modeling (MCM/ICM) **Meritorious Winner (Top 10% Out of World Competitors)**
  - **Multi-Objective Programming**: Proposed a solution for locating Electrical Vehicles charging stations by using multi-objective evolutionary optimization algorithm.
- 2019 Beijing Integrated Circuit Design Competition **First Prize (3%)**

Skills

- **Programming Languages**: C, C++, Python, Verilog, VHDL
- **Packages for Scientific Computing**: SciPy, SymPy, Pandas, Tensorflow, PETSc
- **Tools**: Matlab, COMSOL Multiphysics
- **Hardware Experience**: Laser Doppler Vibrometer, Microcontroller, FPGAs, Raspberry Pi, Oscilloscopes, Multimeters

Teaching Experience

- **Teaching Assistant** — University of Toronto
  ECE 1254 Modeling of Multiphysics System — *Sep 2022 - Dec 2022*
- **Teaching Assistant** — University of Toronto
  ECE 259 Electromagnetism — *Jan 2022 - April 2022*
- **Teaching Assistant** — Hong Kong University of Science and Technology
  PHYS 1115 Laboratory for General Physics II — *June 2021 - Aug 2021*
- **Undergraduate Research Mentor** — Beijing & Hong Kong, China
  Beihang University & HKUST — *June 2020 - Aug 2021*
  - **Beihang University**: Mr. Nianru Wang, Project: Sophisticated Electromagnetic Forward Scattering Solver via Deep Learning. Now at Delft University of Technology.
  - **HKUST**: Mr. Leung Ka Wun Casey, Project: Imaging by Unsupervised Feature Learning of Wave Equation. Now at University of Toronto.