

Gang Li

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Saskatoon, SK, Canada

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Education

Ph.D. Civil Engineering

University of Saskatchewan, Saskatoon, SK, Canada

2023

M.Sc. Civil Engineering

University of Saskatchewan, Saskatoon, SK, Canada

2014

B.Eng. Materials Science and Engineering

Chongqing University, Chongqing City, China

2008

Professional Associations

P.Eng. Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS).

Teaching Experience

Sessional Lecturer

Department of Chemical & Biological Engineering, U of S

- CHE 453 Corrosion Engineering

Department of Civil, Geological and Environmental Engineering, U of S

- CE 212 Civil Engineering Materials

Department of Computer Science, U of S

- CMPT 141 Introduction to Computer Science

St. Peter's College, U of S

- CMPT 142 Introduction to Computer Science for Engineers

Sep, 2019 – Dec, 2019 & Sep, 2022 – Present
Saskatoon, SK, Canada

Muenster, SK, Canada

Teaching Assistant

University of Saskatchewan

- Material testing lab - CE 212 Civil Engineering Materials
- Problem solving lab - CE 318 Applied Engineering Mathematics
- Structural analysis software tutorial lab - CE 463 Advanced Structural Analysis

2009 – 2014 (various terms)
Saskatoon, SK, Canada

Professional Experience

Mitacs Accelerate R&D Engineer

Partnership: City of Saskatoon

- Project title: Effective concrete mixes for Saskatchewan sidewalks using locally available pop-out prone aggregates

I am developing cost-effective remedial strategies for reducing, and possibly eliminating, pop-out damage to concrete sidewalks, as well as other potential forms of damage caused by freeze and thaw cycles and ASR.

Oct, 2022 – Present
Saskatoon, SK, Canada

Mitacs Accelerate R&D Engineer

Partnership: ZACARUK consulting Inc

- Project title: A non-destructive approach for assessing the integrity and performance of waterproofing membranes in bridge decks

I developed a non-destructive method for assessing the integrity of waterproofing systems in reinforced concrete bridge decks. The proposed technique is used to assess the quality of a newly installed membrane system, or to determine whether the membrane is deteriorating during its service life.

Sep, 2021 – Apr, 2022
Regina, SK, Canada

Mitacs Accelerate R&D Engineer

Partnership: ZACARUK consulting Inc

- Project title: A rational data-driven probabilistic approach for assessing the condition and performance of RC structures
- Industrial application:

Sep, 2020 – Apr, 2021
Regina, SK, Canada

- Assessment of Moose Jaw Inland Grain Terminal
- Assessment of Petrofka Bridge

I developed a practical life-cycle deterioration model software that uses measured field data to predict the service condition of existing reinforced concrete structures and to identify novel sensor technology that can be implemented to provide critical field data. I used the software to provide probabilistic results at each deterioration stage of a reinforced concrete structure that can be used to schedule maintenance or repair strategies to extend the life of the asset.

Consultant in contract

ZACARUK consulting Inc

Aug, 2019 – Dec, 2019

Moose Jaw, SK, Canada

- Moose jaw grain station project

I designed the moisture monitoring system for concrete silos and provided personnel training for the installation and operation of the system. I assessed the corrosion condition of the grain station with the field moisture content data.

Research Engineer (full-time & part-time)

University of Saskatchewan, City of Saskatoon

May, 2014 – Sep, 2015 & Sep, 2015 - Apr, 2018

Saskatoon, SK, Canada

- Bridge arch repair and life-cycle cost assessment project

I developed and installed the onsite corrosion monitoring devices for a reinforced concrete arch bridge to monitor the corrosion affecting factors such as moisture content, electrical conductivity, and oxygen content. I extracted and characterized the concrete pore solution composition for the electrochemical testing of the rebar corrosion behaviour. I developed a large-scale transport model to simulate the corrosion environment due to different exposure conditions and climate change. I assessed various rehabilitation strategies and provided recommendations for an effective rehabilitation strategy and timeline to optimize the life-cycle cost.

I led the test panel validation program, oversaw the test panel construction, facilitated the collaboration between the construction companies on multiple rehab treatments, and reported to stakeholders.

Programming experience

Python

Skilled in data science (Pandas, Matplotlib), machine learning (Scikit-Learn, TensorFlow), and advanced computational techniques (probabilistic and numerical modeling). Experienced in object-oriented programming.

COMSOL Multiphysics, MATLAB

Expertise in modeling reactive chemical transport in porous media, electrochemistry, and material mechanics. Proficient in large-scale simulations on high-performance computing clusters.

Software

Li, G., Zacaruk, J., Boulfiza, M. (2022). Rational-RC: a practical life cycle deterioration modelling framework for reinforced concrete structures. Version v0.2.3. ([Documentation](https://magical-sherbet-9ac2a8.netlify.app/) hosted at <https://magical-sherbet-9ac2a8.netlify.app/>)

Li, G., 2021 A [web app](https://share.streamlit.io/ganglix/linescan_minimum_app/main/linescan_app.py) for ground penetrating radar line scan data visualization and measurement https://share.streamlit.io/ganglix/linescan_minimum_app/main/linescan_app.py

Li, G, Evitts, R, & Boulfiza, M. (2018). Homogenized-model-simplified-circuit: code for "the simplified circuit model" (v1.0.0). 2019 NACE Northern Area Western Conference (NACE NAWC 2019). Zenodo. <https://doi.org/10.5281/zenodo.1406210>

Li, G., Evitts, R., Boulfiza, M., & Li, A. (2018). A customized Python module for interactive curve fitting on potentiodynamic scan data (Version v1.0.2). Zenodo. <https://doi.org/10.5281/zenodo.1406195>

Patent

A non-destructive testing technique to assess the integrity of bridge deck membranes, in the application process as the inventor.

Publication

- 14 Li, G., Boulfiza, M., & Evitts, R. A Pore-scale corrosion model for rebar corrosion in concrete: the effect of water and chloride distribution at pore level. (unpublished manuscript)
- 13 Li, G., Boulfiza, M., & Evitts, R. Comprehensive corrosion model of cracked reinforced concrete. (unpublished manuscript)
- 12 Li, G., Boulfiza, M., & Evitts, R. (2023). Effect of accurate microclimate representation on the corrosion performance of a bridge subjected to carbonation and chloride attack. (*Case studies in Construction Materials*, revision stage).
- 11 Li, G., Evitts, R., & Boulfiza, M. (2023). On the corrosion parameters acquired through potentiodynamic scans of carbon steel rebar in simulated pore solution and mortar. *Construction and Building Materials*, 409, 134160.
<https://doi.org/10.1016/J.CONBUILDMAT.2023.134160>
- 10 Li, G., Evitts, R., & Boulfiza, M. (2023). On the interactive effect of moisture, chloride and carbonation on rebar corrosion in mortar. (Submitted to *Construction and Building materials*). Preprint available: <https://dx.doi.org/10.2139/ssrn.4543416>
- 9 Li, G., Evitts, R., & Boulfiza, M. (2023). Dataset of corrosion parameters for rebar in simulated pore solution and mortar (v1.0.1) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.10150202>
- 8 Li, G. (2023). Modelling of crack reinforced concrete corrosion in service environment, PhD Dissertation, University of Saskatchewan, Saskatoon, Canada.
- 7 Li, G., Evitts, R., & Boulfiza, M. (2023). The impact of non-uniformity and resistivity on the homogenised corrosion parameters of rebars in concrete—a circuit model analysis. *Corrosion Engineering, Science and Technology*, 58(4), 399-409.
- 6 Li, G., Boulfiza, M., & Evitts, R. (2019, February) Corrosion Prediction with 3D Model Utilizing Meteorological Data and Properties of Site-extracted Rebar and Concrete. *Proceedings of NACE Northern Area Western Conference*. Calgary, AB, Canada.
- 5 Li, G., Evitts, R., Boulfiza, M., & Li, A. (2018). A customized Python module for interactive curve fitting on potentiodynamic scan data (Version v1.0.2). Zenodo. <https://doi.org/10.5281/zenodo.1406195>
- 4 Kennell, G., Zacaruk, J., Li, G., & Boulfiza, M. (2015). The University Bridge Arch Assessment-A New Approach. In *TAC 2015: Getting You There Safely-2015 Conference and Exhibition of the Transportation Association of Canada*.
- 3 Li, G., Boulfiza, M., & Si, B. (2015). Effect of artificial and natural cracks on water flow in concrete. *Proceedings of the 5th International Conference on Construction Materials*. Whistler, Canada.
- 2 Li, G. (2014). *Effect of Cracks on the Transport Characteristics of Cracked Concrete*, Master's thesis, University of Saskatchewan, Saskatoon, Canada.
- 1 Li, G., & Boulfiza, M. (2013). *Effects of cracking on the transport characteristics of reinforced concrete*. *Proceedings of the 24th Canadian Congress of Applied Mechanics*. Saskatoon, SK, Canada.

Certificate and Awards

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| Certificate in University Teaching and Learning (anticipated in 2024) | University of Saskatchewan |
| Nomination to PhD Thesis Awards/Governor General's Gold Medal | University of Saskatchewan |
| Certificate of Project Management | Mitacs |
| Certificate of Applied Machine Learning in Python | University of Michigan (via Coursera) |
| Certificate of Contribution to the NACE Calgary Sector | National Association of Corrosion Engineers |
| Saskatchewan Innovation and Opportunity Scholarship | Government of Saskatchewan |

Presentations

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| Presentation to Ministry of Highways and Infrastructure (Web conference) | Jul 30, 2020 |
| Deterioration of structures: testing and rehabilitation | |

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| Presentation, NACE Northern Area Western Conference (Regina Canada) Homogenized corrosion parameters of rebars in concrete | Feb 6, 2020 |
| Open Lecture, Saskatoon Engineering Society (Saskatoon Canada) Corrosion Arch Rehab for the Univ Bridge —"provide healthcare to infrastructures" | Nov 29, 2019 |
| Presentation, NACE Northern Area Western Conference (Calgary Canada) Corrosion Prediction with 3D Model Utilizing Meteorological Data and Properties of Site-extracted Rebar and Concrete | Feb 7, 2019 |
| Guest Speaker, NACE Calgary luncheon technical session Topic: Computer-aided Assessment of Arch Rehabilitation Strategies for the University Bridge (30 mins) | Jan 25, 2019 |
| Interview, Global News Topic: "Calcium chloride and its corrosive effects on concrete and asphalt" | Jan 8, 2019 |
| Live Interview, Ryan Jespersen Show, 630CHED radio Podcast: Jespersen - 11 - Corrosion & the maintenance needs of civic structures (Duration 20:40) | Aug 22, 2018 |
