

## EDUCATION

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### National University of Singapore

Ph.D. in Mathematics, Advisors: Prof. Weizhu Bao and Prof. Xuefeng Wang

Singapore

Aug 2018 –Apr 2024

### Southern University of Science and Technology

B.S. in Mathematics

Shenzhen, China

Aug 2014 –Jul 2018

## SKILLS

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- **Technical skills:** Python, C/C++ (Basic), Java (Basic), MATLAB, Julia, FreeFEM++
- **Tools:** Pytorch, Numpy, Pandas, Matplotlib, Sklearn, Git

## RESEARCH INTEREST

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- Partial Differential Equations and Their Applications

My main interest here lies in the study of reaction-diffusion equations on domains with thin layers arising from diverse fields such as material science, biology, and ecology. To reveal the effects of these layers, “*effective boundary conditions*” (EBCs) are imposed by the limit of solutions of the original problem as the thickness of the layer decreases to zero. Moreover, our methodology can also be applied to the wave equations in composites with interface.

- Numerical Analysis

My interest here is to study numerical methods for PDEs, including the bulk-surface finite element method (BSFEM) for systems of coupled bulk-surface PDEs and Neutral Galerkin schemes for solving reaction-diffusion equations through deep learning wherein training data samples were generated using active learning techniques.

## SCHOLARSHIPS AND AWARDS

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- Best paper award of Bachelor in **SUSTech**, Shenzhen, China Jul 2018
- Selected as secondary excellent student in **SUSTech**, Shenzhen, China Aug 2015 –Aug 2017
- Government Scholarship in Southern University of Science and Technology, Shenzhen, China Aug 2014 –Aug 2018

## PUBLICATIONS

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1. **X. Geng** and Y. Wang, *Fractional Laplacian boundary condition as a singular limit of problems degenerating at the boundary*, in preparation.
2. **X. Geng** and Y. Wang, *Effective interface arising from wave equation*, in preparation.
3. **X. Geng** and H. Huang, *Asymptotic spreading of competition diffusion systems with an effective boundary condition on a road*, in preparation.
4. **X. Geng**, *Effective boundary conditions for the Fisher-KPP equation with 3-dimensional optimally aligned coatings*, preprint, 2024.
5. **X. Geng**, *Effective boundary conditions for heat equation arising from anisotropic and optimally aligned coatings in three dimensions*, under review, 2023.
6. **X. Geng**, *Effective boundary conditions arising from the heat equation with three-dimensional interior inclusion*, Commum. Pure Appl. Anal. 2022.

## CONFERENCES AND TALKS

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- PhD Dissertation Defense Presentation, National University of Singapore, Singapore Apr 18, 2024
  - Title: *Effective Boundary Conditions for the Fisher-KPP Equations*
- 2023 Winter Conference on Partial Differential Equations, Nankai University, Tianjin, China Dec 1 - 3, 2023
  - Title: *Effective Boundary Conditions for 3-dimensional Optimally Aligned Coatings*
- PDE and Scientific Computing Seminar, University of Singapore, Singapore Nov 04, 2022
  - Title: *A Hamilton-Jacobi Approach for Asymptotic Propagation Shape of a Road-field Model*
- 2022 SciCADE, University of Iceland, Reykjavik, Iceland Jul 24 - 29, 2022
  - Title: *Effective Boundary Conditions for the Heat Equation with Three-dimensional Anisotropic and Optimally Aligned Coatings*
- PDE and Scientific Computing Seminar, University of Singapore, Singapore Nov 2, 2019
  - Title: *The Method of Moving Planes and Sliding Domains*

## TEACHING EXPERIENCE

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- Spring 2021 Ordinary Differential Equations (**TA**)
- Spring 2020 Ordinary Differential Equations (**TA**)
- Spring 2019 Math Clinic(**TA**)
- Fall 2018 Linear Algebra and Mathematical Analysis (**TA**)

## INTERESTS

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- **Swimming**
- **Running**
- **Boxing**
- **Tennis**

## LANGUAGES

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- **Chinese:** Native
- **English:** Fluent
- **German:** Basic
- **Japanese:** Basic