Ziyi Xi

Computational Seismology, Full Waveform Inversion, High Performance Computing, and Heterogeneous Computing

Department of Computational Mathematics Science and Engineering, Michigan State University
Room 2506, Engineering Building, 428 South Shaw Lane, East Lansing, MI 48824, USA
Email: xiziyi@msu.edu | Phone: +1(517)505-0802

Education

2018 – present	**Ph.D.** student in Computational Science (**Mentor: Prof. Min Chen)** Michigan State University, East Lansing, MI, USA
2015 – 2018	**B.E.** in Computer Science (dual) (**Mentor: Prof. Guangzhong Sun)** University of Science and Technology of China, Hefei, China **Thesis**: An implementation of the parallel simulated annealing algorithm and its application in optimization problems (GPA 3.25/4.30)
2014 – 2018	**B.S.** in Geophysics (**Mentor: Prof. Daoyuan Sun)**) Member of the Zhao Jiuzhang Talent Program in Earth and Space Sciences University of Science and Technology of China, Hefei, China **Thesis**: Refactoring and optimation of the package FK for the seismic waveform calculation (GPA 3.67/4.30)

Employment

2018 – present	**Graduate Research Assistant** Michigan State University
2017	**Teaching Assistant of theoretical mechanics (level A)** University of Science and Technology of China
2017	**Summer Research Intern in geophysics** University of California, Los Angeles
2016	**Teaching Assistant of Electromagnetism (level A)** University of Science and Technology of China

Awards & Honors

2019	Conference Travel Funding awarded by MSU CMSE Graduate Studies Committee
2018	Ginther Graduate fellowship, Michigan State University, USA
2017	Outstanding Student Scholarship (First Class), University of Science and Technology of China, China
2016	College physics innovation research experiment competition (First Prize)
2016	Support from the National basic subject talent training plan, Ministry of Education, China
2016	Zhao Jiuzhang Scholarship, University of Science and Technology of China, China
2015	Zhao Jiuzhang Scholarship, University of Science and Technology of China, China

Professional Societies & Activities

2021 – present	Member of the European Geosciences Union (EGU)
2020 – present	Member of the Seismological Society of America (SSA)
2019 – present	Member of the American Geophysical Union (AGU)
2020	Talk on the Eastern Session of the Seismological Society of America
2019	Poster presentation in the AGU fall meeting
2019	Poster presentation in the Gordon Research Conference, South Hadley, US
2019	Participate in the Munich Earth Skience School, Munich, Germany

Peer-reviewed Publications

*corresponding author, #co-first author.

Papers in Preparation

1. **Xi, Z.***, Chen, M., Zhou, T., Li, J., Wang, B., Kim, Y. A New East Asia Radially Anisotropic Model EARA2021 of the Eurasia Continents and the Western Pacific Subduction Zones.

2. Chen, M.*, **Xi, Z.**, Grima, A. Existence of a low-viscosity layer beneath the 660-km discontinuity based on the orphan slabs imaged beneath East Asia.

Papers Submitted

1. Zhou, T.*, **Xi, Z.**, Chen, M., Li, J. Initial model assessment for intermediate-period full-waveform inversion of the contiguous U.S. and surrounding regions (Submitted to Geophys. J. Int, https://doi.org/10.31223/X5V599).

2. Li, J.*, Chen, M., Ning, J., Zhou T., **Xi, Z.**, Li, G. Fast Trip: A fast MPI-accelerated 1-D triplication waveform inversion package for constraining the mantle discontinuities. (Submitted to Seismic Research Letters)

Models

1. East Asia Radial Anisotropy Model 2021 (EARA2021)
   A 3D radial anisotropy Earth velocity model of East Asia and Western Pacific Slabs. The product is to be submitted to the Incorporated Research Institutions for Seismology, EarthModels (IRIS-EMC). The model can be viewed at https://eara2020.ziyixi.science.

Open Source softwares

1. pyfk (see https://github.com/ziyixi/pyfk)
   Pyfk implements the propagation matrix method to calculate the Green's function and the synthetic waveforms for the 1D Earth model. It has also been paralleled using MPI/CUDA, with 100x speed up.

Meeting Abstracts

1. **Xi, Z.**, Chen, M., Zhou, T., Wang, B., Kim, Y. (2020) Slab Thinning Controls the Distribution of Large Deep Intraslab Earthquakes in the Western Pacific Subduction Zones. #T018-0021 virtually presented at 2020 AGU Fall Meeting.
2. Chen, M., **Xi, Z.**, Kiser, E., Kehoe, H. (2020) Slab morphology at the source region of the 2015 Mw 7.9 Bonin earthquake imaged by full waveform inversion. #S035-0011 virtually presented at 2020 AGU Fall Meeting.
3. Li, J., Chen, M., Zhou, T., **Xi, Z.**(2020) Double-difference adjoint tomography of the Cascadia subduction zone. #S063-0011 virtually presented at 2020 AGU Fall Meeting.
4. Zhou, T., Chen, M., **Xi, Z.**(2020) Lithospheric structure of the North American Craton constrained by full waveform inversion. #T034-0010 virtually presented at 2020 AGU Fall Meeting.
5. **Xi, Z.**, Chen, M., Zhou, T., Wang, B., Kim, Y. (2019) Towards a Refined 3D Model of the Western Pacific Slab to Investigate the Nature of Deep Earthquakes. #T21F-0384 presented at 2019 AGU Fall Meeting.
6. Zhou, T., **Xi, Z.**, Chen, M. (2019) Full waveform inversion of the crust and upper mantle model beneath the contiguous US. #S23A-07 presented at 2019 AGU Fall Meeting.
7. Chen, M., **Xi, Z.**(2019) Short-period Full Waveform Modeling of the Spatial Relationships of Fine Slab Structure and Deep Earthquakes beneath Japan and Izu-Bonin. #S13C-0440 presented at 2019 AGU Fall Meeting.
8. Chen, M., Zhou, T., **Xi, Z.**(2019) Validation of Seismic Crustal and Mantle Models of the Contiguous U.S. Presented at 2019 SSA Annual Meeting.

Expertise & Skills

Languages	Mandarin Chinese, English.
Computer Skills	**Frontend** Skilled in HTML, CSS, Javascript, React.js and QT. (my personal website: https://ziyixi.science/); EARA2021 model viewer: https://eara2020.ziyixi.science/; Wechat mini program: https://github.com/ziyixi/wechat_mpvue
	Programming languages Python, Julia, C/C++, Javascript, Fortran.
	GPU computing CUDA C/C++/Python/Julia, Nvidia CUDA packages like cuBLAS and cuSOLVER, multiple GPU communication (NCCL)
	Scientific computing Familiar with Slurm and parallel computing with MPI (Research package: https://github.com/ziyixi/seisflow)
	Machine Learning (familiar with Tensorflow, Pytorch and Flux (Julia), have taken classes in deep learning)
	Others Docker, Database (SQL), Quantum Computing (taking class, familiar with Qiskit) (My dockerhub account: https://hub.docker.com/u/xiziyi)
Music	Cucurbit flute (Chinese traditional instrument) (Skilled); Guitar (Entry-level); Piano (Entry-level)
Driving	Michigan Driver's License