YUTO LEWIS TERASHIMA

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CURRENT RESEARCH INTEREST

Keywords : Multi-scale Simulation, Coupled FEM–MD Analysis, and Tensor Train Decomposition

PUBLICATION (INTERNATIONAL JOURNAL)

1. Y. L. Terashima, P. E. Brumby, T. Murashima, V. Kouznetsova, and M. Muramatsu, Fine-scale Structural Stability of Carbon Dioxide Hydrate Pellets under Coarse-scale Deformation Using Multi-Scale Coupled FEM-MD Simulations, *Materials Today Communications*, **38**, 108322, 2024.

PUBLICATION (IN JAPANESE)

1. M. Muramatsu, Y. Yamazaki, and Y. Terashima, Coupled MD–FEM Simulations for Nano polycrystalline Aluminium, *Materials–The Society of Materials Science of Japan*, **73**(8), 13602, 2024.
2. Y. Terashima and A. Kusuhata, Probability of Cosmic Rays Reaching the Earth's Surface, *The Journal of the Physical Society of Japan*, **71**, 146, 2016.

PUBLICATION (ARXIV)

1. Y. Sato, Y. L. Terashima, and R. Kondo, Efficient Computational Homogenization via Tensor Train Format, *arXiv preprint arXiv*, 2407. 18870, 2024.

AWARDS

Best Presentaion Award for Collaborative Research Idea Hackathon September 2024
Presenter Tsukuba, Ibaraki

- I won the best presentation award at the JSCES summer student conference.

CONFERENCE & TALKS

JSME 37th Computational Mechanics Division Conference October 2024
Presenter Sendai, Japan

- Oral Presentation : Homogenized Dynamic Finite Element–Molecular Dynamics Simulation for Deformation Analysis of Polycarbonate

The 4th International Workshops on Advances in Computational Mechanics September 2024
Research Collaborator Kitakyushu, Japan

- Research Collaborator : A Multiscale FEM-MD Coupling Method for Investigation on Atomistic-scale Deformation Mechanisms under Continuum-scale Deformation

The 16th World Congress on Computational Mechanics July 2024
Presenter Vancouver, Canada

- Oral Presentation : A Study of Continuum–scale Stress Calculation on Finite Element Method Induced by Molecular–scale Structural Transition

The 29th Computational Engineering and Science Symposium June 2024
Presenter Kobe, Japan

- Oral Presentation and Proceedings : Multi–scale Coupling of Molecular-scale Structural Transformation and Continuum-scale Element Deformation

The 9th Eur. Congr. Comput. Methods Appl. Sci. Eng. June 2024
Research Collaborator Lisbon, Portugal

- Research Collaborator : Effective MD-FEM Coupling Simulation Using Clustering Method

The 37th Molecular Simulation Symposium December 2023
Presenter Tokyo, Japan

- Poster Presentation :
  FEM-MD Multi-scale Simulation for Macroscopic Deformation of Clathrate Hydrate
- Research Collaborator : The acceleration of Coupled MD-FEM Simulation Using k-means Method

OIST-KEIO Showcase Talk Series 5 November 2023
Presenter Okinawa, Japan

- Flash Talk : Finite Element–Molecular Dynamics Multi-scale Simulation for Hydrate

JSME 36th Computational Mechanics Division Conference October 2023
Presenter Toyohashi, Japan

- Oral Presentation : A Study on Large–scale Mechanical Properties Using Coupled FEM-MD Simulation

The 17th U. S. National Congress on Computational Mechanics July 2023
Presenter Albuquerque, U.S.A.

- Oral Presentation : An Investigation of Structural Stability of Carbon Dioxide Hydrate Pellets for Carbon Neutral Applications via Coupled MD-FEM
- Research Collaborator : A Numerical Molecular Dynamics Simulation Study on The Leakage of Harmful Greenhouse Gases along Structural Fractures in Clathrate Hydrates

The 28th Computational Engineering and Science Symposium June 2023
Presenter Tsukuba, Japan

- Oral Presentation and Proceedings :
  Microscopic Structural Stability of Hydrate under Macroscopic Deformation

The 36th Molecular Simulation Symposium December 2022
Presenter Tokyo, Japan

- Poster Presentation : MD-FEM Coupling Simulation of Hydrate for Structural Stability

RESEARCH EXPERIENCE

Research Assistant at AIST (Quantum Application Team) July 2024 - Present

- We are developing a linear solver for the mechanical simulations using the tensor train decomposition.

Mitou-Target Program for Quantum Computing Technology June 2023 - February 2024

- Our team is developing multiple delivery optimization software for drone delivery services using quantum annealing machines.

Research Internship at TOYOTA R. & D. Labs. August 2023 - September 2023

- I developed the homogenized thermal conduction and elastic problems using tensor network.

Master's Thesis April 2023 - Present

- I am currently working on developing coupled dynamic FEM-MD simulation.

Bachelor's Thesis April 2022 - March 2023

- I am currently examining the mechanical properties of carbon dioxide hydrate pellets using coupled molecular dynamics and finite element method simulations at Keio University.
- I utilized the coupled MD-FEM method to see the fine scale structures of hydrate under complex coarse scale deformation, such as unequal tensile, circumferential tension, bending, and twisting.

Academic-Industrial Cooperation Research Project April 2022 - March 2023

- Our team is currently working to solve aging problems in Japan's agriculture through combinatorial optimization using quantum annealing machines. The supervisor of this project is Associate Professor Mayu Muramatsu.
- We won the first prize and received $2,400 in research funding from KII (Keio Innovation Initiative).

Independent Studies in Mechanical Engineering September 2020 - March 2021

- I worked on the structural optimization of trusses using genetic algorithms as part of my coursework in Mechanical Engineering at Keio University.

Junior Session in the Physical Society of Japan March 2016
Presenter Sendai, Miyagi

- I wrote a paper [1] on the verification of the special theory of relativity by observation of μ-particles and made a poster presentation.

Science Program at Bard High School Early College December 2015
Exchange Student New York, NY

- I gave an oral presentation in English on my research on μ particles as a part of the exchange program in New York.

Research Program at the High Energy Accelerator Research Organization August 2015
Researcher Tsukuba, Ibaraki

- I conducted an experiment using scintillators to observe μ particles and determine their average velocity.

TEACHING EXPERIENCE

Teaching Assistant of Industrial Engineering Project November 2024 - March 2025

- I support bachelor students for their coursework, Independent Studies in Mechanical Engineering. Especially, I taught how to implement numerical analysis applications.

Teaching Assistant of Keio Information Technology Center April 2023 - March 2025

- I worked as a technical advisor at Keio Information Technology Center.

Teaching Assistant of Independent Studies November 2023 - January 2024

- I support bachelor students for their coursework, Independent Studies in Mechanical Engineering. Especially, I taught how to implement numerical analysis applications.

Teaching Assistant of Mechanics of Materials May 2022 - December 2022

- I taught mechanics of materials, numerical analysis, and molecular simulation to bachelor students at Keio University.

Scientific Conference for High School Students March 2022
Teaching Assistant and Organizer Nagoya, Aichi

- I organized and taught high school students how to conduct research with university professors at Noyori Conference Hall, Nagoya University.

EDUCATION

M.S. in Computational Mechanics, Keio University, Japan
April 2023 - March 2025

- GPA : Overall 4.00/4.00, Major 4.00/4.00
- Master's Thesis : A Study on Multiscale Boundary Conditions in Coupled Homogenized FEM–MD Simulations for Atomistic–to–Continuum Modeling

- Supervisor : Professor Kenji Yasuoka
- Co–supervisor : Associate Professor Mayu Muramatsu

B.S. in Mechanical Engineering, Keio University, Japan
April 2019 - March 2023

- GPA : Overall 3.34/4.00, Major 3.66/4.00
- Bachelor's Thesis : A Study on The Structural Stability of Carbon Dioxide Hydrate Pellets Using Coupled MD–FEM Simulations
- Supervisor : Associate Professor Mayu Muramatsu

SKILLS

Simulation	Proficient	Finite Element Methods, Molecular Dynamics, Quantum Anealing, and Tensor Network
Software	Proficient	LAMMPS, LaTeX, Ovito, and Paraview
	Working knowledge:	Abaqus, Solidworks and Ansys
Programming	Proficient:	Python, Fortran, MATLAB, Shell, PHP, and TeX
	Working knowledge:	C, C++, Arduino, HTML, CSS, FastAPI JavaScript, Vue.js, and Laravel
Operating System	Proficient:	Linux, Windows, and macOS
Language	Native:	Japanese
	Fluent:	English, TOEFL iBT: 94 (R24 L27 S22 W21)
	Basic:	German and Italian

EXTRACURRICULAR ACTIVITY

Volunteer at Nosé 40 November 2024
Organizing Committee Yokohama, Japan

- I helped organized workshop on phase space sampling using molecular simulation for celebrating the 40th year of the Nosé dynamics (Nosé 40).

Qiskit Hackathon Taiwan 2024 August 2024
Participant Taipei, Taiwan

- I participated in Qiskit Hackathon Taiwan 2024 and developed a fast variational quantum eigensolver for calculation of chemical potential.

Volunteer at USACM July 2023
Member of Student Chapter Albuquerque, U.S.A.

- I helped organize the poster session and registration at the 17th U. S. National Congress on Computational Mechanics as a member of student chapter in USACM (U. S. Association for Computational Mechanics).

Internship at IESO July 2021 - Present
Project Leader and Developer Online

- I developed an IoT device and web page at IESO (IT Engineer Training and Support Organization) and received the MVP award for leadership in this internship. Currently, I am working at IESO as a developer of our online education system.

Volunteer at AIESEC May 2020 - April 2022
Project Leader Online

- I took the initiative to develop online discussion programs for university students from Asia at AIESEC (Association Internationale des Étudiants en Sciences Économiques et Commerciales). The theme of our discussions was about how to realize inclusive sustainable development in Asia led by economic incentives.