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Brief Curriculum Vitae | Mikio SAKAI

SHORT BIO

Dr. Mikio Sakai is a Full Professor in the Department of Nuclear Engineering and Management at The University of Tokyo and an internationally recognized leader in Discrete Element Method (DEM) and particle-resolved simulation of granular and multiphase flows. He received his Ph.D. from The University of Tokyo in 2006 and joined the university as an Assistant Professor in 2007, was promoted to Associate Professor in 2008, and to Full Professor in 2023. Professor Sakai has established a strong international presence through long-standing collaborations and visiting appointments, including Imperial College London (Visiting Reader, 2016–2023; Visiting Professor, 2023–present) and the University of Surrey (Visiting Professor, 2019–2025). His research focuses on high-fidelity modeling and simulation of granular and multiphase flows, large-scale parallel computation, and data-driven computational mechanics, including AI-based surrogate modeling and data science approaches for powder and particle systems. He is widely regarded as one of the leading experts in computational granular dynamics, and his work has significantly advanced the predictive capability of discrete element, continuum, and hybrid multiscale methods for industrial and geophysical particulate systems. Professor Sakai has delivered numerous invited and keynote lectures at major international conferences and has received several prestigious awards in recognition of his scientific contributions, including the SCEJ Award for Outstanding Research Achievement (The Society of Chemical Engineers, Japan), the IP Award (Information Center of Particle Technology), and the JACM Computational Mechanics Award (Japan Association for Computational Mechanics). He plays a prominent leadership role in the international powder and particle technology community. He served as Chair of the 10th International Conference on Discrete Element Methods, is a Director of the Society of Powder Technology of Japan, Head of its Modeling and Simulation Division, and Chair of the AI Technical Committee of the Association of Powder Process Industry and Engineering, Japan. He currently serves as an Editor for Chemical Engineering Science and Granular Matter, and as an Associate Editor of Powder Technology.

PERSONAL INFORMATION

Name	:	Mikio SAKAI
Position	:	Full Professor (Department Chair) , The University of Tokyo
h-index	:	36 (SCOPUS)
Address	:	7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656 JAPAN
Tel/FAX	:	+81-3-5841-6977
E-mail	:	mikio_sakai@n.t.u-tokyo.ac.jp
URL	:	https://dem.t.u-tokyo.ac.jp/index.html
SCOPUS	:	https://www.scopus.com/authid/detail.uri?authorId=8320813800

CORE RESEARCH TOPICS

High-fidelity modeling and simulation of granular and multiphase flows using the DEM
High-performance parallel computation for DEM and CFD–DEM simulations
AI-based surrogate modeling and data-driven mechanics for powder systems
Verification, validation, and uncertainty quantification of DEM and multiphase flow simulations
Simulation-based digital twin for powder processes and energy systems

EDUCATION

Ph.D., Department of Quantum Engineering and Systems Science,
School of Engineering, The University of Tokyo, 2006

WORK EXPERIENCE

Academic Appointments

2023 - present	:	Full Professor, Department of Nuclear Engineering and Management, School of Engineering, The University of Tokyo
2008 - 2023	:	Associate Professor, School of Engineering, The University of Tokyo
2007 - 2008	:	Assistant Professor, School of Engineering, The University of Tokyo

Visiting Appointments

2023 - present	:	Visiting Professor, Imperial College London, UK
2019 - 2025	:	Visiting Professor, University of Surrey, UK

2016 - 2023 : Visiting Reader, Imperial College London, UK

SELECTED PROFESSIONAL SERVICES

2026- present	:	Associate Editor, Powder Technology (Elsevier)
2018 - present	:	Editor, Granular Matter (Springer)
2015 - present	:	Editor/Associate Editor, Chemical Engineering Science (Elsevier)
2025 - present	:	Guest Executive Editor, Powder Technology (Elsevier)
2020	:	Guest Editor, Powder Technology (Elsevier)
2024 - 2026	:	Division Chair, Computational Science and Engineering Division, Atomic Energy Society of Japan
2025	:	Chairperson, 10th International Conference on Discrete Element Methods (DEM10)

SELECTED FUNDING (Principal Investigator, Recent 5 years)

Grant

2025 – 2027	:	Eichi Project, International Collaborative Research Program (Japan–UK Joint Research for Nuclear Decommissioning)
2024 – 2026	:	JSPS KAKENHI Grant-in-Aid for Challenging Research (Exploratory)
2021 – 2024	:	JSPS KAKENHI Grant-in-Aid for Scientific Research (A)
2021 – 2023	:	JSPS KAKENHI Grant-in-Aid for Challenging Research (Exploratory)

Large-scale industry-funded collaborative research

2024 - 2027	:	Digital Twin Fundamental Technology Course for Next Generation Resource Circulation Solutions
2023 - 2026	:	Digital Twin Fundamental Technology Course for Next Generation Powder Process Systems

SELECTED AWARDS

2025	:	ICCCI Outstanding Contribution Award	International Conference on the Characterization and Control of Interfaces for High Quality Advanced Materials
2023	:	JACM Computational Mechanics Award	Japan Association for Computational Mechanics
2023	:	The SCEJ Award for Outstanding Research Achievement	Society of Chemical Engineers, Japan
2019	:	IP Award	Information Center of Particle Technology
2016	:	JACM Fellows Award	Japan Association for Computational Mechanics
2014	:	Frontier Award	Fluid & Particle Processing Division, The Society of Chemical Engineers, Japan

PUBLICATIONS

Journal papers: 120

Selected papers

- K.-E. Yang, S. Li, M. Sakai, "Development and validation of a multi-timescale reduced-order model for high-speed simulations of solid-fluid systems," *Phys. Fluids*, 37 (2025) 083423.
- S. Li, M. Sakai, "Advanced graph neural network-based surrogate model for granular flows in arbitrarily shaped domains," *Chem. Eng. J.,* 500 (2024) 157349.
- G. Duan, S. Li, M. Sakai, "Feasibility analysis of POD-based reduced order model with application in Eulerian-Lagrangian simulations," *Ind. Eng. Chem. Res.*, 63 (2023) 780-796.
- K. Tamura, Y. Mori, K. Takabatake, M. Sakai, "Validation study on a toroidal approximation-based capillary force model in the discrete element method simulation," *Phys. Fluids*, 34, 023319 (2022)
- Y. Mori, M. Sakai, "Development of a robust Eulerian-Lagrangian model for the simulation of an industrial solid-fluid system," *Chem. Eng. J.*, 406, 126841 (2021).
- Y. Mori, C.-Y. Wu, M. Sakai, " Validation study on a scaling law model of the DEM in industrial gas-solid flows," *Powder Technol.*, 343, 101–112 (2019).
- X. Sun, M. Sakai, "Three-dimensional simulation of gas-solid-liquid flows using the DEM-VOF method," *Chem. Eng. Sci.*, 134, 531-548 (2015)
- M. Sakai et al., "Verification and validation of a coarse grain model of the DEM in a bubbling fluidized bed," *Chem. Eng. J.*, 244, 33-43 (2014).
- X. Sun, M. Sakai, Y. Yamada, "Three-dimensional simulation of a solid-liquid flow by the DEM-SPH method," *J. Comput. Phys.*, 248, 147-176 (2013)
- M. Sakai, S. Koshizuka, "Large-Scale Discrete Element Modeling in Pneumatic Conveying," *Chem. Eng. Sci.*, 64, 533-539 (2009)

Invited, Keynote and Plenary lectures: 112

Selected lectures

- M. Sakai, "Bridging DEM Simulations and Data Science: New Frontiers in Industrial Powder Processing," International Congress on Particle Technology 2025 (Partec 2025), September 23–25, 2025, Nuremberg, Germany [keynote]
- M. Sakai, “What technologies are essential in development of the DEM-based digital twin?”, 9th International Conference on Discrete Element Methods (DEM9), Erlangen, Germany, Sept 17-21, 2023 [plenary]
- M. Sakai, “On a simulation-based digital twin towards the realization of smart manufacturing in the powder industry,” The Asian Pacific Confederation of Chemical Engineering (APCChE) 2023, Manila, Philippines, Sept 4-8, 2023 [plenary]
- M. Sakai, “Powder Process Digital Twin: Advancements in Discrete Element Method Simulation,” International Symposium on Simulation and Modelling of Particulate Systems (SIMPAS-2023), 25-28 August 2023, Suzhou, China [plenary]
- M. Sakai, “State-of-the-art modeling of computational granular dynamics for a simulation-based digital twin," 9th World Congress on Particle Technology, Madrid, 18-22 Sept., 2022 [keynote]