

Changho Kim

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Research Interests

Stochastic modeling of multi-physics multi-scale phenomena

Scientific computing and machine learning

Education

Brown University

Ph.D. and M.Sc. in Applied Mathematics (Advisor: George Em Karniadakis)

Providence, RI

2010 – 2015

KAIST (Korea Advanced Institute of Science and Technology)

Ph.D. and M.Sc. in Chemistry (Advisor: Eok Kyun Lee)

Daejeon, South Korea

2001 – 2007

B.Sc. in Chemistry and Mathematics (Double major, *summa cum laude*)

1997 – 2001

Employment

University of California, Merced

Assistant Professor

Merced, CA

2018 – present

Lawrence Berkeley National Laboratory

Postdoctoral Researcher (Advisor: John B. Bell)

Berkeley, CA

2015 – 2018

KAIST (Korea Advanced Institute of Science and Technology)

Postdoctoral Researcher in Mathematics Department / Business School

Daejeon / Seoul, South Korea

2007 – 2009

Grants and Research Fellowships

Funded Extramural Grants

1. *National Science Foundation (NSF), Division of Mathematical Sciences (DMS), Conferences and Workshops in the Mathematical Sciences*, “Conference: 1st SIAM Northern and Central California Sectional Conference”, Co-PI, \$40,000, September 2024 – August 2025. [[Award No. NSF DMS-2433859](#)]
2. *Department of Energy (DOE), Advanced Scientific Computing Research (ASCR), Funding for Accelerated, Inclusive Research (FAIR)*, “Machine-Learning-Based Surrogate Modeling for Stochastic Multiscale Simulation Methodology”, PI, \$750,000, July 2023 – June 2026. [[Award No. DE-SC0024240](#)]
3. *National Science Foundation (NSF), Division of Chemistry (CHE), Launching Early-Career Academic Pathways in the Mathematical and Physical Sciences*, “LEAPS-MPS: Stochastic Particle-Continuum Hybrid Simulation Method for Model Heterogeneous Catalysts under Reaction Conditions”, PI, \$250,000, August 2022 – July 2026. [[Award No. NSF CHE-2213368](#)]
4. *Foundation for California Community Colleges, California Learning Lab, The Grand Challenge Overcoming the Calculus Barrier to STEM Success*, “Why, What and How” Calculus, Co-PI, \$1,400,000, July 2021 – December 2024.

Research Fellowships

1. *Sustainable Research Pathways (SRP) Program, Summer Research at Lawrence Berkeley National Lab*, “Numerical Coupling of Fluctuating Hydrodynamics with Surface Chemistry (Year 2)”, PI, \$48,720, Fellowship for PI (C. Kim) and two graduate students, June 2022 – August 2022.
2. *Sustainable Research Pathways Program (SRP), Summer Research at Lawrence Berkeley National Lab*, “Numerical Coupling of Fluctuating Hydrodynamics with Surface Chemistry (Year 1)”, PI, \$36,000, Fellowship for PI (C. Kim) and two graduate students, June 2021 – August 2021.

Funded Internal Grants (UC Merced)

1. *Academic Senate Faculty Research Grants program*, “Intriguing Mathematical Structure and Properties Observed in

the Reversible Adsorption of Dimers on Finite Lattices”, PI, \$19,872, July 2024 – June 2025.

2. *EJIE (Equity, Justice, & Inclusive Excellence) Speaker/Workshop Series Award*, Inviting Dr. Mary Ann Leung (Sustainable Horizons Institute) to give an EJIE seminar on "Normalizing Inclusion by Embracing Difference", PI, \$3,200, Fall 2024.
3. *Academic Senate Faculty Research Grants program*, "Multiscale Modeling of Cell Membrane Electroporation", PI, \$10,000, July 2019 – June 2021.

Publications

(* indicates that I served as the (co-)corresponding author)

1. Y. Lei, F. Blanchette, C. Kim, "D2R2 for math circles", *MathCircular Magazine* (Publisher: American Institute of Mathematics), Autumn 2025, 7 (2025) [[website](#)].
2. M. Polimeno, C. Kim, F. Blanchette, "Internal stresses in low-Reynolds-number fractal aggregates", *Phys. Rev. Fluids* 10, 074304 (2025) [[DOI](#)]
3. M. Polimeno, C. Kim*, F. Blanchette, I. Srivastava, A.L. Garcia, A.J. Nonaka, J.B. Bell, "Thermodynamic consistency and fluctuations in mesoscopic stochastic simulations of reactive gas mixtures", *J. Chem. Phys.* 162, 154107 (2025). [[DOI](#)]
4. S.-J. Kim, W.J. Kim, C. Kim, E.K. Lee, H. Kim, "PROFiT-Net: Property-networking deep learning model for materials", *J. Am. Chem. Soc.* 146, 26000 (2024). [[DOI](#)]
5. Z. Aguirre-Muñoz, M. Almeida, C. de Souza, K.C. Thompson, K. Tran, Y. Lei, E.M. Rutter, L.G. Oka, M. Viveros, B.E. Salazar, C. Kim, "Unlocking success in calculus for engineering majors: Impact of engagement tactics for underrepresented undergraduate engineering students", American Society for Engineering Education Annual Conference Proceedings (ASEE PEER) 48205 (2024). [[DOI](#)]
6. E. Mercado, H.T. Jung, C. Kim*, A.L. Garcia, A.J. Nonaka, J.B. Bell, "Surface coverage dynamics for reversible dissociative adsorption on finite linear lattices", *J. Chem. Phys.* 159, 144107 (2023). [[DOI](#)]
7. Y. Zhu, H. Lei, C. Kim, "General validity of the second fluctuation-dissipation theorem in the nonequilibrium steady state: Theory and applications", *Phys. Scr.* 98, 115402 (2023). [[DOI](#)]
8. Y. Zhu, Y.-H. Tang, C. Kim, "Learning stochastic dynamics with statistics-informed neural network", *J. Comput. Phys.* 474, 111819 (2023). [[DOI](#)]
9. M. Polimeno, C. Kim*, F. Blanchette, "Toward a realistic model of diffusion-limited aggregation: Rotation, size-dependent diffusivities, and settling", *ACS Omega* 7, 40826 (2022). [[DOI](#)]
10. M. Mancini, M. Theillard, C. Kim*, "Projection method for the fluctuating hydrodynamics equations", *J. Comput. Phys.* 463, 111288 (2022). [[DOI](#)]
11. J.H. Lee, C. Kim*, M.E. Colvin, "Molecular dynamics studies of the melting kinetics of superheated crystals", *J. Phys. Chem. C* 126, 4199 (2022). [[DOI](#)]
12. M.R. Parsa, C. Kim*, A.J. Wagner, "Nonuniqueness of fluctuating momentum in coarse-grained systems", *Phys. Rev. E* 104, 015304 (2021). [[DOI](#)]
13. J.H. Lee, C. Kim*, M. Tokman, M.E. Colvin, "Energy component analysis of electric field-induced shape change in water nanodroplets", *J. Phys. Chem. C* 125, 6933 (2021). [[DOI](#)]
14. K.J. Cho, S. Gim, H.-K. Lim, C. Kim*, H. Kim, "Water slippage on graphitic and metallic surfaces: Impact of surface packing structure and electron density tail", *J. Phys. Chem. C* 124, 11392 (2020). [[DOI](#)]
15. K.-S. Kim, C. Kim*, G.E. Karniadakis, E.K. Lee, J.J. Kozak, "Density-dependent finite system-size effects in equilibrium molecular dynamics estimation of shear viscosity: Hydrodynamic and configurational study", *J. Chem. Phys.* 151, 104101 (2019). [[DOI](#)]
16. A. Donev, A.J. Nonaka, C. Kim, A.L. Garcia, J.B. Bell, "Fluctuating hydrodynamics of electrolytes at electroneutral scales", *Phys. Rev. Fluids* 4, 043701 (2019). [[DOI](#)]
17. C. Kim*, A.J. Nonaka, J.B. Bell, A.L. Garcia, A. Donev, "Fluctuating hydrodynamics of reactive liquid mixtures", *J. Chem. Phys.* 149, 084113 (2018). [[DOI](#)]
18. K.-S. Kim, M.H. Han, C. Kim*, Z. Li, G.E. Karniadakis, E.K. Lee, "Nature of intrinsic uncertainties in equilibrium molecular

- dynamics estimation of shear viscosity for simple and complex fluids”, *J. Chem. Phys.* 149, 044510 (2018). [\[DOI\]](#)
19. A. Donev, C.-Y. Yang, [C. Kim](#), “Efficient reactive Brownian dynamics”, *J. Chem. Phys.* 148, 034103 (2018). [\[DOI\]](#)
 20. K.H. Han, [C. Kim](#)*, P. Talkner, G.E. Karniadakis, E.K. Lee, “Molecular hydrodynamics: Vortex formulation and sound wave propagation”, *J. Chem. Phys.* 148, 024506 (2018). [\[DOI\]](#)
 21. B. Choi, K.H. Han, [C. Kim](#), P. Talkner, A. Kidera, E.K. Lee, “Nature of self-diffusion in two-dimensional fluids”, *New J. Phys.* 19, 123038 (2017). [\[DOI\]](#)
 22. [C. Kim](#)*, A.J. Nonaka, J.B. Bell, A.L. Garcia, A. Donev, “Stochastic simulation of reaction-diffusion systems: A fluctuating-hydrodynamics approach”, *J. Chem. Phys.* 146, 124110 (2017). [\[DOI\]](#)
 23. X. Bian, [C. Kim](#), G.E. Karniadakis, “111 years of Brownian motion”, *Soft Matter* 12, 6331 (2016). [\[DOI\]](#)
 24. [C. Kim](#), O. Borodin, G.E. Karniadakis, “Quantification of sampling uncertainty for molecular dynamics simulation: Time-dependent diffusion coefficient in simple fluids”, *J. Comput. Phys.* 302, 485 (2015). [\[DOI\]](#)
 25. [C. Kim](#), G.E. Karniadakis, “Brownian motion of a Rayleigh particle confined in a channel: A generalized Langevin equation approach”, *J. Stat. Phys.* 158, 1100 (2015). [\[DOI\]](#)
 26. X. Li, Z. Li, X. Bian, M. Deng, [C. Kim](#), Y.-H. Tang, A. Yazdani, G.E. Karniadakis, “Dissipative particle dynamics, overview” (2015). In B. Bhushan (Ed.), *Encyclopedia of Nanotechnology*, Springer, Dordrecht. [\[DOI\]](#)
 27. [C. Kim](#), G.E. Karniadakis, “Time correlation functions of Brownian motion and evaluation of friction coefficient in the near-Brownian-limit regime”, *Multiscale Model. Simul.* 12, 225 (2014). [\[DOI\]](#)
 28. [C. Kim](#), G.E. Karniadakis, “Microscopic theory of Brownian motion revisited: The Rayleigh model”, *Phys. Rev. E* 87, 032129 (2013). [\[DOI\]](#)
 29. H. Kim, W.A. Goddard III, K.H. Han, [C. Kim](#), E.K. Lee, P. Talkner, P. Hänggi, “Thermodynamics of d -dimensional hard sphere fluids confined to micropores”, *J. Chem. Phys.* 134, 114502 (2011). [\[DOI\]](#)
 30. H.K. Shin, [C. Kim](#), P. Talkner, E.K. Lee, “Brownian motion from molecular dynamics”, *Chem. Phys.* 375, 316 (2010). [\[DOI\]](#)
 31. [C. Kim](#), P. Talkner, E.K. Lee, P. Hänggi, “Rate description of Fokker–Planck processes with time-periodic parameters”, *Chem. Phys.* 370, 277 (2010). [\[DOI\]](#)
 32. H. Kim, [C. Kim](#), E.K. Lee, P. Talkner, P. Hänggi, “Wall-mediated self-diffusion in slit and cylindrical pores”, *Phys. Rev. E* 77, 031202 (2008). [\[DOI\]](#)
 33. [C. Kim](#), E.K. Lee, P. Hänggi, P. Talkner, “Numerical method for solving stochastic differential equations with Poissonian white shot noise”, *Phys. Rev. E* 76, 011109 (2007). [\[DOI\]](#)
 34. [C. Kim](#), E.K. Lee, P. Talkner, “Numerical method for solving stochastic differential equations with dichotomous noise”, *Phys. Rev. E* 73, 026101 (2006). [\[DOI\]](#)
 35. H.J. Lee, [C. Kim](#), J.G. Kim, E.K. Lee, “A general scheme for studying the stochastic dynamics of a parametric oscillator driven by coloured noise”, *J. Phys. A: Math. Gen.* 37, 647 (2004). [\[DOI\]](#)
 36. J.-W. Lee, [C. Kim](#), E.K. Lee, J. Kim, S. Lee, “Qubit geometry and conformal mapping”, *Quantum Information Processing* 1, 129 (2002). [\[DOI\]](#)

Manuscripts Under Review

(* indicates that I served as the (co-)corresponding author)

1. H.T. Jung, H. Kim, A.L. Garcia, A.J. Nonaka, J.B. Bell, I. Srivastava, [C. Kim](#)*, “Thermodynamically consistent incorporation of the Langmuir adsorption model into compressible fluctuating hydrodynamics”, Under review for publication in *J. Chem. Phys.* (submitted, October 2025). [\[arXiv\]](#)
2. Z. Aguirre-Muñoz, M. Viveros, B. Salazar, M. Tokman, L.G. Oka, K.C. Thompson, E.M. Rutter, K. Tran, [C. Kim](#), Y. Lei, M. Almeida, R. Menon, “Roles of mathematics-related psychological factors in STEM sense of belonging and identity: A structural equation modeling analysis”, Under review for publication in *Int. J. STEM Edu.* (revised manuscript submitted, October 2025).
3. A.L. Garcia, J.B. Bell, A. Nonaka, I. Srivastava, D. Ladiges, [C. Kim](#), “An introduction to computational fluctuating hydrodynamics”, Under review for publication in *SIAM Review* (submitted, April 2025). [\[arXiv\]](#)

High-Performance Computing Software and Web Application Distribution

1. M. Velez, C. Kim, Y. Lei, F. Blanchette, “Web-based Game: D2R2 (Draw 2 Remove 2)” (2025). <https://bit.ly/d2r2math>
2. J.B. Bell, A.J. Nonaka, C. Kim, D. Ladiges, A. Donev, “Stochastic Hybrid Models and Algorithms for Fluids (FHDeX) v1”, DOE Code (2019). [DOI] [git repository]
3. A. Donev, C.-Y. Yang, C. Kim, “SRBD: Stochastic Reactive Brownian Dynamics” (2017). [git repository]

Presentations (since 2015)

At Professional Meetings (Invited)

1. *SIAM Central States Section Annual Meeting 2025 (CSS25)*, “Continuum-based stochastic simulation method for reactive microfluids”, (Fayetteville, AR, 2025).
2. *5th Biennial Meeting of the Pacific Northwest Section of SIAM (PNW25)*, “Statistics-informed neural network as a surrogate modeling tool”, (Seattle, WA, 2025).
3. *SIAM Conference on Computational Science and Engineering (CSE25)*, “Analyzing a mesoscopic hydrodynamic simulation method via its structure factors and correlation functions”, (Fort Worth, TX, 2025).
4. *SIAM Conference on Computational Science and Engineering (CSE25)*, “Incorporating the Langmuir adsorption model into compressible fluctuating hydrodynamics”, (Fort Worth, TX, 2025). Listed as a co-author; Presented by H.T. Jung.
5. *SIAM Conference on Computational Science and Engineering (CSE25)*, “Learning kinetic Monte Carlo using statistics-informed neural network”, (Fort Worth, TX, 2025). Listed as a co-author; Presented by Z. Xu.
6. *AMS Spring Western Sectional Meeting*, “Thermodynamically-consistent coupling of fluctuating hydrodynamics and kinetic Monte Carlo for gas-solid Interfaces”, (Fresno, CA, 2023).
7. *AMS Spring Western Sectional Meeting*, “Simulations of the formation and settling of marine aggregates”, (Fresno, CA, 2023). Listed as a co-author; Presented by F. Blanchette.
8. *SIAM Conference on Computational Science and Engineering (CSE23)*, “Thermodynamically-consistent coupling of fluctuating hydrodynamics and kinetic Monte Carlo for gas-solid Interfaces”, (Amsterdam, the Netherlands, 2023).
9. *SIAM Annual Meeting (AN22)*, “Stochastic multiscale simulation method for heterogeneous catalysts: Concurrent coupling of kinetic Monte Carlo and fluctuating hydrodynamics”, (Hybrid, Pittsburgh, PA, 2022).
10. *SIAM Conference on Computational Science and Engineering (CSE21)*, “Stochastic multiscale simulation method for heterogeneous catalysts: Concurrent coupling of kinetic Monte Carlo and fluctuating hydrodynamics” (Virtual, Fort Worth, TX, 2021).
11. *41st Stochastic Processes and their Applications Conference (SPA 2019)*, “Characterization of non-local and non-Markovian nature in the dynamics of a molecular fluid” (Evanston, IL, 2019).
12. *SIAM Conference on Computational Science and Engineering (CSE19)*, “Fluctuating hydrodynamics simulations of reactive electrolyte solutions” (Spokane, WA, 2019).
13. *SIAM Annual Meeting (AN18)*, “Fluctuating hydrodynamics approach toward realistic simulation of reactive microfluids” (Portland, OR, 2018).
14. *SIAM Conference on Mathematical Aspects of Materials Science (MS18)*, “Fluctuating hydrodynamics of reactive liquid mixtures” (Portland, OR, 2018).
15. *SIAM Conference on Computational Science and Engineering (CSE17)*, “Investigation of the molecular aspects of fluctuating hydrodynamics through the memory function approach” (Atlanta, GA, 2017).
16. *SIAM Conference on Computational Science and Engineering (CSE17)*, “Fluctuating hydrodynamics of reaction-diffusion systems” (Atlanta, GA, 2017).
17. *Mach Conference*, “Uncertainty quantification in molecular dynamics simulation of fluid systems: statistical errors and finite-system-size effects” (Annapolis, MD, 2016).
18. *DPD Workshop*, “Quantifying uncertainties in equilibrium particle dynamics simulations” and “Tutorial: Calculating material properties from LAMMPS” (Shanghai, China, 2015).
19. *Mach Conference*, “Uncertainty quantification on the evaluation of the diffusion coefficient from molecular dynamics

simulation” (Annapolis, MD, 2015).

20. *SIAM Conference on Computational Science and Engineering (CSE15)*, “The long-time tail of the velocity autocorrelation function of a particle in a molecular fluid” (Salt Lake City, UT, 2015).

At Professional Meetings (Contributed)

1. *2023 SACNAS National Diversity in STEM (NDiSTEM) Conference*, “Stochastic analysis of the diffusion equation using simulations of Brownian particles”, (Columbus, OH, 2025). Listed as a co-author; Presented by L. Gil Rojo.
2. *Northern and Central California Section of SIAM Annual Meeting 2025 (NCC25)*, “Statistics-informed neural network as a surrogate modeling tool”, (Berkeley, CA, 2025).
3. *Northern and Central California Section of SIAM Annual Meeting 2025 (NCC25)*, “Learning time trajectories of a stochastic dynamical system with a slowly varying parameter”, (Berkeley, CA, 2025). Listed as a co-author; Presented by Z. Xu.
4. *Northern and Central California Section of SIAM Annual Meeting 2025 (NCC25)*, “Equilibrium statistics of the stochastic heat equation”, (Berkeley, CA, 2025). Listed as a co-author; Presented by S. Singh.
5. *CECAM Workshop - Dynamics of Non-Equilibrium Variables (DoNEV)*, “Thermodynamic consistency and fluctuations in mesoscopic stochastic simulations of reactive gas mixtures”, (Zaragoza, Spain, 2025).
6. *SIAM Annual Meeting (AN25)*, “Statistics-informed neural network” (Montreal, Canada, 2025).
7. *SIAM Annual Meeting (AN25)*, “Boundary integral simulations of forming and breaking fractal aggregates” (Montreal, Canada, 2025). Listed as a co-author; Presented by F. Blanchette.
8. *2025 KCS (Korean Chemical Society) 135th General Meeting & Exhibition*, “Modeling gas-surface interactions with Langmuir adsorption model and compressible fluctuating hydrodynamics”, (Suwon, South Korea, 2025). Listed as a co-author; Presented by H.T. Jung.
9. *ACS (American Chemical Society) Spring 2025 Meeting & Expo*, “Thermodynamic consistency and fluctuations in mesoscopic stochastic simulations of reactive gas mixtures”, (San Diego, CA, 2025).
10. *2025 Joint Mathematics Meetings (JMM 2025)*, “Equilibrium surface coverage for reversible adsorption of dimers on various finite lattice structures”, (Seattle, WA, 2025). Listed as a co-author; Presented by E. Park.
11. *2025 Joint Mathematics Meetings (JMM 2025)*, “R2D2 (remove-2-draw-2) and the power of pairs: A math circle problem origin story”, (Seattle, WA, 2025). Listed as a co-author; Presented by Y. Lei.
12. *8th International Conference on Electronic Materials and Nanotechnology for Green Environment (ENGE 2024)*, “Coupling of Langmuir adsorption model and compressible fluctuating hydrodynamics for multispecies gas mixtures”, (Jeju, South Korea, 2024). Listed as a co-author; Presented by H.T. Jung.
13. *APS (American Physical Society) DFD (Division of Fluid Dynamics) Annual Meeting*, “Internal stresses in low-Reynolds-number fractal aggregates”, (Salt Lake City, UT, 2024). Listed as a co-author; Presented by F. Blanchette.
14. *SIAM Conference on Mathematics of Data Science (MDS24)*, “Extending statistics-informed neural network to multidimensional stochastic processes”, (Atlanta, GA, 2024). Listed as a co-author; Presented by Z. Xu.
15. *Northern and Central California Section of SIAM Annual Meeting 2024 (NCC24)*, “Extending statistics-informed neural network to multidimensional stochastic processes”, (Merced, CA, 2024). Listed as a co-author; Presented by Z. Xu.
16. *Northern and Central California Section of SIAM Annual Meeting 2024 (NCC24)*, “Equilibrium surface coverage for reversible adsorption of dimers on various finite lattice structures”, (Merced, CA, 2024). Listed as a co-author; Presented by E. Park.
17. *11th International Conference on Multiscale Materials Modeling (MMM11)*, “Thermodynamically-consistent coupling of fluctuating hydrodynamics and kinetic Monte Carlo for gas-solid interfaces”, (Prague, Czech Republic, 2024).
18. *SIAM Annual Meeting (AN24)*, “Extending statistics-informed neural network to multidimensional stochastic processes” (Spokane, WA, 2024). Listed as a co-author; Presented by Z. Xu.
19. *Modelling, Data Analytics and AI in Engineering (MadeAI 2024)*, “Statistics-informed neural network: Performance analysis”, (Porto, Portugal, 2024).
20. *2024 ASEE (American Society for Engineering Education) Annual Conference & Exposition*, “Unlocking success in calculus for engineering majors: Impact of engagement tactics for underrepresented undergraduate engineering

- students”, (Portland, OR, 2024). Listed as a co-author; Presented by Z. Aguirre-Muñoz.
21. *National Conference on Undergraduate Research (NCUR 2024)*, “Equilibrium surface coverage for reversible adsorption of dimers on various finite lattice structures”, (Long Beach, CA, 2024). Listed as a co-author; Presented by E. Park.
 22. *2024 NARST (National Association for Research in Science Teaching) Annual International Conference*, “Active engagement strategies in undergraduate calculus: Learning how to sustain success for URM STEM majors”, (Denver, CO, 2024). Listed as a co-author; Presented by Z. Aguirre-Muñoz.
 23. *Korean Institute of Metals and Materials (KIM+) Computational Materials Science Division Winter Symposium*, “Coupling of kinetic Monte Carlo simulation and fluctuating hydrodynamics for surface kinetics of heterogeneous catalyst”, (Busan, South Korea, 2024). Listed as a co-author; Presented by H.T. Jung.
 24. *2024 Joint Mathematics Meetings (JMM 2024)*, “The Role of Active Engagement and Mathematics-Related Factors in Calculus Performance”, (San Francisco, CA, 2024). Listed as a co-author, Presented by Z. Aguirre-Muñoz.
 25. *APS (American Physical Society) DFD (Division of Fluid Dynamics) Annual Meeting*, “A boundary integral approach to breaking up marine aggregates”, (Washington, D.C., 2023). Listed as a co-author; Presented by M. Polimeno.
 26. *2023 SACNAS National Diversity in STEM (NDiSTEM) Conference*, “Modeling infectious disease spread: Comparison of the agent-based-modeling and differential-equation approaches”, (Portland, OR, 2023). Listed as a co-author; Presented by E. Park.
 27. *2023 ASEE (American Society for Engineering Education) Annual Conference & Exposition*, “The Role of Mathematics-Related Factors in Optimizing Engineering Sense of Belonging and Identity in Minority Serving Institutions”, (Baltimore, MD, 2023). Listed as a co-author; Presented by Z. Aguirre-Muñoz.
 28. *APS March Meeting 2023*, “Thermodynamically-consistent formulation of stochastic chemistry for modeling reactive gas dynamics at small scales”, (Hybrid, Las Vegas, NV, 2023). Listed as a co-author; Presented by M. Polimeno.
 29. *10th International Conference on Multiscale Materials Modeling (MMM10)*, “Stochastic multiscale simulation method for heterogeneous catalysts: Concurrent coupling of kinetic Monte Carlo and fluctuating hydrodynamics”, (Baltimore, MD, 2022).
 30. *SIAM Annual Meeting (AN22)*, “Characterizing the growth rate and fractal dimension of marine aggregates formed through Brownian dynamics”, (Hybrid, Pittsburgh, PA, 2022). Listed as a co-author; Presented by M. Polimeno.
 31. *SIAM Annual Meeting (AN22)*, “Complete characterization of two-site adsorption / desorption processes: Finite system-size effect on equilibrium and time-transient surface coverage”, (Hybrid, Pittsburgh, PA, 2022). Listed as a co-author; Presented by E. Mercado.
 32. *32nd International Symposium on Rarefied Gas Dynamics (RGD32)*, “Stochastic multiscale simulation method for heterogeneous catalysts: Concurrent coupling of kinetic Monte Carlo and fluctuating hydrodynamics”, (Hybrid, Seoul, Korea, 2022).
 33. *APS (American Physical Society) DFD (Division of Fluid Dynamics) Annual Meeting*, “Modeling the formation mechanism and growth rate of aggregates through Brownian dynamics”, (Phoenix, Arizona, 2021). Listed as a co-author; Presented by M. Polimeno.
 34. *LAMMPS Workshop and Symposium*, “Concurrent coupling of kinetic Monte Carlo and fluctuating hydrodynamics (SPPARKS-MUI-FHDeX)”, (Virtual, Philadelphia, PA, 2021).
 35. *LAMMPS Workshop and Symposium*, “Surface chemistry implementation in SPPARKS”, (Virtual, Philadelphia, PA, 2021). Listed as a co-author; Presented by E. Mercado.
 36. *Bernoulli-IMS 10th World Congress in Probability and Statistics*, “Statistical mechanical model of adsorption at a surface interface in contact with an ideal gas”, (Virtual, Seoul, Korea, 2021).
 37. *21st Symposium on Thermophysical Properties*, “Stochastic hybrid multiscale model for gas-solid interfacial systems”, (Virtual, Boulder, CO, 2021).
 38. *APS (American Physical Society) DFD (Division of Fluid Dynamics) Annual Meeting*, “Momentum fluctuations in coarse-grained fluid models”, (Virtual, Chicago, IL, 2020). Listed as a co-author; Presented by M.R. Parsa.
 39. *APS (American Physical Society) DFD (Division of Fluid Dynamics) Annual Meeting*, “A Brownian dynamics model for the formation of marine aggregates”, (Seattle, WA, 2019). Listed as a co-author; Presented by F. Blanchette.

40. *ACS (American Chemical Society) Spring 2019 National Meeting & Expo*, “Fluctuating hydrodynamics of electrolytes at electroneutral scales”, (Orlando, FL, 2019).
41. *Yosemite Fluids Meeting*, “Fluctuating hydrodynamics approach toward realistic simulation of reactive microfluids”, (Wawona, CA, 2018).
42. *20th Symposium on Thermophysical Properties*, “Fluctuating hydrodynamics of reactive liquid mixtures”, (Boulder, CO, 2018).
43. *Texas Applied Mathematics and Engineering Symposium*, “Stochastic simulation method for reactive microfluids under thermal fluctuations”, (Austin, TX, 2017).
44. *SIAM Annual Meeting (AN17)*, “Stochastic simulation of reaction-diffusion systems: Fluctuating hydrodynamic approach”, (Pittsburgh, PA, 2017).
45. *SIAM Conference on Computational Science and Engineering (CSE15)*, “Uncertainty quantification for the estimation of the diffusion coefficient from MD Simulations”, (Salt Lake City, UT, 2015).

At Educational, Governmental Institutions or Similar Organizations (Invited unless otherwise noted)

1. *University of California, Santa Barbara*, Department of Mathematics, “Statistics-informed neural network and its application to multiscale stochastic modeling”, (Virtual, Santa Barbara, CA, May 2025).
2. *University of California, Santa Cruz*, Applied Mathematics Department, “Statistics-informed neural network and its application to multiscale stochastic modeling”, (Santa Cruz, CA, May 2025).
3. *California State University, Long Beach*, Mathematics and Statistics, “Statistics-informed neural network (SINN)”, (Virtual, Long Beach, CA, 2024)
4. *Kyungpook National University, Department of Applied Chemistry*, “Thermodynamically-consistent coupling of fluctuating hydrodynamics and kinetic Monte Carlo for gas-solid interfaces”, (Daegu, South Korea, 2023).
5. *University of California, Merced*, Department of Applied Mathematics, “The “Why, What and How” Calculus Project”, (Merced, CA, 2023). Co-presented by M. Tokman, Z. Aguirre-Muñoz, and K. Tran.
6. *Fritz Haber Institute of the Max Planck Society*, Theory Department, “Stochastic multiscale simulation methods for reactive microfluids and heterogeneous catalysts” (Virtual, Berlin, Germany, 2022).
7. *Brown University*, Division of Applied Mathematics, “Learning stochastic dynamics with statistics-informed neural network”, (Virtual, Providence, RI, 2022). Co-presented by Y. Zhu.
8. *POSTECH*, Department of Mathematics, “Stochastic multiscale simulation methods for reactive microfluids and heterogeneous catalysts”, (Virtual, Pohang, South Korea, 2022).
9. *University of California, Merced*, Department of Applied Mathematics, “The “Why, What and How” Calculus Project”, (Merced, CA, 2022). Co-presented by M. Tokman, Z. Aguirre-Muñoz, and K. Tran.
10. *University of Massachusetts, Amherst*, Department of Mathematics and Statistics, “Stochastic multiscale simulation methods for reactive microfluids and heterogeneous catalysts”, (Virtual, Amherst, MA, 2021).
11. *Lawrence Berkeley National Laboratory (LBNL)*, Sustainable Research Pathways (SRP) Workshop, “Development of Stochastic Hybrid Multiscale Models for Gas-Solid Interfacial Systems”, (Virtual, Berkeley, CA, 2020). SRP application accepted.
12. *Korea University*, Department of Mathematics, “Stochastic modeling: Toward realistic simulation of microfluidic, biological, and nanomaterial systems”, (Seoul, South Korea, 2018).
13. *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*, School of Undergraduate Studies, “Scientific computing and modeling in multidisciplinary research”, (Daegu, South Korea, 2018).
14. *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*, School of Undergraduate Studies, “Computer simulation and stochastic multiscale modeling study on molecular dynamical systems”, (Daegu, South Korea, 2018).
15. *University of California, Merced*, Applied Mathematics Unit, “Toward realistic simulation of microfluidic, biological, and nanomaterial systems”, (Merced, CA, 2018).
16. *University of California, Santa Cruz*, Applied Mathematics and Statistics Department, “Stochastic simulation method for reactive microfluids under thermal fluctuations”, (Santa Cruz, CA, 2017).
17. *Brown University*, Division of Applied Mathematics, “Stochastic simulation method for reactive microfluids under thermal

fluctuations”, (Providence, RI, 2017).

18. *San Jose State University*, Department of Mathematics, “Simulating reactive fluids and reaction-diffusion systems at small scales”, (San Jose, CA, 2017).
19. *Pennsylvania State University*, Department of Mathematics, “Fluctuating hydrodynamics approach for the simulation of reactive fluids and reaction-diffusion systems at small scales”, (State College, PA, 2017).
20. *Stanford University, Summer School on Multiscale Modeling of Materials*, “Memory function approach and Brownian motion theory”, (Stanford, CA, 2016).
21. *Computational Science Research Center (CSRC)*, “Quantifying uncertainties in equilibrium particle dynamics simulations”, (Beijing, China, 2015).
22. *Computational Science Research Center (CSRC)*, “Tutorial: Calculating material properties from LAMMPS”, (Beijing, China, 2015).
23. *Lawrence Berkeley National Laboratory (LBNL)*, Computing Sciences, “Analysis and simulation of molecular systems: Memory function approach and uncertainty quantification”, (Berkeley, CA, 2015).
24. *Columbia University*, Applied Physics and Applied Mathematics, “Analysis and simulation of molecular systems: Memory function approach, effects of confinement, and uncertainty quantification”, (New York, NY, 2015).

Teaching / Pedagogy (since 2018)

Teaching at UC Merced

Linear Algebra & Differential Equations (MATH024, lower-division course, 120-200 students)

Fall 25, Fall23, Fall22, Spring20

Real Analysis (MATH101, upper-division course, 20 students)

Spring23

Numerical Linear Algebra (MATH146, upper-division course, 40-60 students)

Spring21, Spring19

Stochastic Processes (MATH181, upper-division course, 20 students)

Spring25, Spring22

Numerical Analysis I (MATH231, graduate course, 10 students)

Fall21, Fall20, Fall19

Teaching / Pedagogy Program Participation

Students Assessing Teaching and Learning (SATL) Program: “Mid-Semester Feedback Support Program” and “Closing the Assessment Cycle in Community” (UC Merced, Spring 2025)

Boost Student Learning Community Program (UC Merced, Spring 2022)

UC Davis-UC Merced Faculty Learning Community in STEM Program (UC Merced, AY20-21)

Online Summer Institute on Scientific Teaching (National Institute on Scientific Teaching, July 2020)

“Scientific Teaching: Small Changes to Impact Your Classroom Tomorrow” Workshop (UC Merced, January 2020)

Workshop on Engaged Teaching and Learning in the Sciences (UC Merced, Fall 2018)

Student Research Mentoring

Graduate Students

Matteo Polimeno (Ph.D. 2024; co-advised by F. Blanchette) [[Ph.D. Thesis](#)]

May 2020 – August 2024

Zihan Xu (Ph.D. candidate)

August 2022 – present

Satinderpreet Singh (Ph.D. student)

August 2024 – present

Indar Freitas

August 2022 – May 2024

Yibing Wang (co-advised by E. Rutter)

August 2022 – August 2023

Enrique Mercado

June 2020 – August 2022

Undergraduate Students

Patrick Park

June 2023 – present

Adi Kisieu	June 2025 – present
Leonardo Gil Rojo	June 2025 – present
Mario Velez	September 2024 – May 2025
Enrique Mercado	June 2019 – May 2020
<u>Short-term projects:</u> Axel Muniz Tello (Summer 2024), Pamela Aguilar Basantes (Spring 2024), Perla Ayon Rivera (Spring 2024), Indar Freitas (Summer 2021), Arnold Khampaseut (Summer 2021)	

Visiting Students

Hyun Tae Jung (Ph.D. student, Chemistry, KAIST)	August 2022 – August 2023
Marc Mancini (Master thesis project, École Polytechnique)	April 2019 – August 2019

External Mentoring

Hyun Tae Jung (Ph.D. candidate, Chemistry, KAIST)	April 2021 – present
Guy Moore (Undergraduate student, University of the Pacific)	June 2018 – August 2019
Kang-Sahn Kim (Ph.D. 2019, Chemistry, KAIST)	September 2015 – February 2019
Kyeong Hwan Han (Ph.D. 2018, Chemistry, KAIST)	September 2015 – August 2018
Bongsik Choi (Ph.D. 2018, Chemistry, KAIST)	September 2017 – February 2018

Serving as a Thesis Committee Member

UC Merced Applied Mathematics: Eunji Yoo (Ph.D. 2023), Jared Stewart (Ph.D. 2024), Tri Nguyen (Ph.D. 2024), Amandeep Kaur (M.S. 2023), Scott West, Matthew Blomquist, Hardeep Bassi

UC Merced Chemistry: Hanbo Hong (Ph.D. 2024)

Postdoc Mentoring and Supervision

M. Reza Parsa	May 2019 – April 2021
Yuanran Zhu (Visiting Assistant Professor)	January 2020 – May 2022

University Service**Department Level**

Vice Undergraduate Chair	Spring 2025 – present
Department Website Administrator	Fall 2018 – July 2024
Committees (Undergraduate Program)	
Applied Math Undergraduate Curriculum Committee (Chair)	Spring 2025 – present
Task Force (Undergraduate Program)	
Revising curricula of the linear algebra sequence (MATH 024 / 041 / 141 / 140 / 146)	Spring 2025 – present
Creating Applied Math Major Emphasis Track in Education	Spring 2024 – present
Distant Course Delivery Facilitation Task Force (COVID-19)	Spring 2020 – Fall 2020
Committees (Graduate Program)	
Graduate Curriculum Committee (new curriculum developed)	AY23-24, AY22-23
Graduate Fellowship Awards Committee	AY24-25, AY23-24, AY22-23, AY18-19
Preliminary Exam Committee	AY23-24, AY22-23, AY21-22, AY20-21, AY19-20
Graduate Admissions Committee	AY19-20, AY18-19
Committees (Search)	
Faculty Hire Search Committee (3 new faculty members hired)	AY22-23
Search Committee for Visiting Assistant Professor (VAP) and Departmental Postdoc	AY21-22, AY19-20

Committees (Case Analysis)

AY24-25 (Lecturer Pre-Six Review), AY23-24 (Lecturer Excellence Review), AY21-22 (Continuing Lecturer Review), AY20-21 (VAP Review, Lecturer Excellence Review)

Lecturer Mentoring and Evaluation

James Ogaja (AY24-25), Huifang Dou (AY22-23), Yuanran Zhu (AY21-22)

Event / Program Coordination

Bobcat Day Tabling Event for Applied Math Undergraduate Program 2025, 2024, 2022
 Faculty Lead of Summer Bridge Program for Incoming Applied Math Graduate Students 2025, 2024

Seminar Coordination

Scientific Computing and Data Science Seminar Spring 2022 – Fall 2024
 Applied Mathematics Seminar Fall 2019

Outreach to Undergraduate Students via Fun Math Activities

- **“Problem of the Month”, Organizer** Fall 2021 – present

To stimulate student engagement in math, every month during the semester, undergraduate students are invited to solve a challenging math problem posted on the Applied Math department website. Noteworthy solutions are recognized and awarded prizes. There are monthly gatherings for students to present and discuss their solutions. Math problems are carefully constructed so that students can apply both their analytical and computational math skills. [\[webpage\]](#)

- **“Math-Magic” Event, Organizer** Fall 2021 – present

In the beginning of each academic year, undergraduates with math or other STEM majors are invited to the event. Students participate in intriguing math activities with applied math faculty and graduate students. In addition, there is an information session on resources, opportunities, and events that are offered by the Applied Mathematics department.

- **Faculty Advisor of Math Club** Fall 2023 – present

During the semester, students meet weekly or biweekly for fun math activities (e.g. math puzzles, math jeopardy, math memes) or career development activities (e.g. inviting graduate students for research presentations and career panels). Since Spring 2025, I have hosted biweekly meetings where students can work together to solve intriguing math problems.

School Level**Departmental Instructional Points of Contact Committee (COVID-19)** AY20-21

To facilitate effective communication between the school and the departments during the distance learning period due to COVID-19, faculty members representing each department had monthly meetings with the Associate Dean for Academic Programs to discuss various time-sensitive issues pertaining to distance learning.

Campus Level**Reviewer (Office of Research Development)** Spring 2024

Reviewing pre-proposals submitted for a limited submission opportunity from DOE

Professional Service**Conference Organization**

- **1st Meeting of the Northern and Central California Section of SIAM (SIAM NCC24)** October 2024

Local Organizing Committee Member. Nearly 200 students and researchers from academic institutions, industry, and the national laboratories participated. There were 4 plenary talks, 10 minisymposia, 4 panel discussions, and 66 poster presentations.

- **International Conference on Molecular Simulation (ICMS 2019)** November 2019

Conference Organizing Committee Member. A total of 440 researchers from 22 countries attended and a total of 320 presentations were delivered.

Special Session / Minisymposium Organization

- SIAM CSE25 Conference, **Minisymposium Organizer** March 2025

“Computational Fluctuating Hydrodynamics: Mathematical Introduction and Applications”

- AMS Spring Western Sectional Meeting, **Special Session** Organizer May 2023
Special Session on Scientific Computing
- SIAM CSE23 Conference, **Minisymposium** Organizer February 2023
“Stochastic and Multiscale Modeling Approaches for Interfacial Systems”
- SIAM AN22 Conference, **Minisymposium** Organizer July 2022
“Stochastic Modeling and Simulation Methods in Biology and Chemistry”
- SIAM CSE21 Conference, **Minisymposium** Organizer March 2021
“Mesoscopic and Microscopic Modeling of Hydrodynamics of Complex Fluids”

Program Organization

- **Building Engagement Program** at SIAM CSE25 (BE@CSE25), Application Chair / Organizing Committee Member
 - **Broader Engagement Program** at SIAM MDS24 (BE@MDS24), Application Chair / Organizing Committee Member
 - **Broader Engagement Program** at SIAM MDS22 (BE@MDS22), Application Chair / Organizing Committee Member
 - **Broader Engagement Program** at SIAM CSE21 (BE@CSE21), Application Chair / Organizing Committee Member
- The **BE Program** is intended to better engage groups consistently underrepresented in STEM by providing a rich scientific program, mentoring, and career and professional development at a chosen SIAM conference. The BE program also aims to transform mainstream Science and Technology communities by normalizing inclusion. [\[webpage\]](#)

Mentoring for Career Development

- **Cal-Bridge Program**, UC Faculty Mentor AY22-23, AY23-24
The Cal-Bridge program creates opportunities for members of historically underrepresented groups, including women, underrepresented minorities (URMs), members of the LGBTQ+ community, those with disabilities, and first-generation students, to participate and advance in STEM fields including physics, astronomy, computer science/engineering, and mathematics, to increase their numbers in PhD programs targeting the UC and other partner institutions.
- **Undergraduate Career Panel at SIAM NCC24** October 2024
Invited 3 panelists and moderated the panel discussion.
- **SIAM Virtual Resume-building Workshop** October 2024
Reviewed CVs of one graduate student and two postdocs and gave feedback.
- At BE@CSE25: **Guided Affinity Group** Leader for “Scientific Computing for Biological and Chemical Applications” (assigned to 4 undergraduate students and 2 graduate students).
- At SIAM MDS24: **Mentoring program** (assigned to two postdocs).
- At SIAM CSE23: **Affinity Group Leader** for “Reduced-Order Modeling” (assigned to four graduate students).
- At SIAM CSE21: **Mentoring program** (assigned to one graduate student).
- At SIAM CSE19: **Mentoring program** (assigned to one graduate student).

Panel Review

- **NSF DMS** (Division of Mathematical Sciences) panel Spring 2021

Ad-hoc Proposal Reviewer

- **NSERC** (Natural Sciences and Engineering Research Council of Canada) External Assessment 2025

Peer review

Journal of Chemical Physics, Journal of Computational Physics, Journal of Fluid Dynamics, Physics of Fluids, SIAM Review, Journal of the Royal Society Interface, Journal of Statistical Physics, Physical Review E, Journal of Physics A, European Physical Journal B, Communications in Applied Mathematics and Computational Science (CAMCoS), Nonlinearity, Journal of Nonlinear Science, Journal of Molecular Liquids, Chemical Engineering Science, Scientific Reports

Seminar Coordination

Monthly Seminar of KSEA (Korean-American Scientists and Engineers Association) Berkeley Chapter 2016 – 2018

Public Service

Merced Math Teachers' Circle (MMTC) 2019 – present

Co-organizer. MMTC connects K-12 mathematics teachers, college and university mathematics professors, and all mathematics educators in the Central Valley area of California centered around Merced, whose students are traditionally underrepresented in STEM. Through regular meetings with fun, creative, and meaningful math problem-solving activities, the participants share and (re-)experience the excitement of doing mathematics so that they may bring that enthusiasm into their own classrooms. When schools were back to regular classes after the pandemic, we were also back to in-person meetings. Currently, we meet 2-3 times each semester.

Summer Workshop for Local STEM Teachers May 2025

Organizer. Local STEM Teachers are invited to participate in a one-day workshop, where participants explore various methods of estimating, computing, and approximating the value of π . During the morning session, participants investigate more traditional or deterministic methods, whereas they experience probabilistic and computational methods in the afternoon session.

Applied Math Challenge for Local High School Students Summer 2022

Co-organizer. Local high school students were invited to participate in a two-week-long mathematical challenge working collaboratively with other students under the mentorship of a UC Merced graduate student mentor. The graduate student mentors assisted students to understand core mathematical ideas as the team works on creating a poster presentation on their methods and results for solving a real-world problem.

Teaching Korean Language to American Adults at Rhode Island Korean School 2011 – 2015

Professional Development Fellowships

1. UC Merced, NCFDD (National Center for Faculty Development and Diversity) Summer Faculty Success Program Fellowship, \$4,450, Summer 2022.
2. UC Merced, Faculty Success Initiative - Extramural Funding Fellowship (FSI-EFF), \$3,000, 2021.

Computing Cluster Experience

DOE User Facilities: National Energy Research Scientific Computing Center (NERSC), Argonne Leadership Computing Facility (ALCF), Oak Ridge Leadership Computing Facility (OLCF)

UC Merced: Pinnacles cluster, MERCED cluster

Professional Memberships

Society for Industrial and Applied Mathematics (SIAM) 2012 – present

Korean-American Scientists and Engineers Association (KSEA) 2015 – present

American Chemical Society (ACS), American Mathematical Society (AMS), American Physical Society (APS), Bernoulli Society for Mathematical Statistics and Probability, Biophysical Society (BPS)

Awards and Scholarships

Sigma Xi Award 2015

Dunmu Ji Award (Division of Applied Mathematics, Brown University) 2015

Korea Government Scholarship: Study Abroad Program 2010 – 2012

NRF (National Research Foundation of Korea) – DAAD (German Academic Exchange Service) Graduate Student Exchange Program (Mentors: Peter Hänggi and Peter Talkner, University of Augsburg, Germany) 2005