CURRICULUM VITAE

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Scholar profile

CCSE Project scientist
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Work profile

EDUCATION

Ph.D.	Chemical Engineering, University of Colorado (Advisor: Christine Hrenya)	2018
M.S.	Chemical Engineering, University of Colorado	2017
B.S.	Chemical Engineering, *magna cum laude*, University of Washington	2013
B.S.	Bio-Resource Engineering, *magna cum laude*, University of Washington	2013

RESEARCH EXPERIENCE

2022 - Present	**CCSE Project scientist**, Development of the ERF solver, which is a modern, flexible, and efficient GPU-capable software for the simulation of microscale wind plant environments, Lawrence Berkeley Laboratory.
2021 - 2022	**Computational engineer**, Profiling and implementation of non-spherical particles within the MFiX-DEM solver, Leidos Inc.
2019 - 2021	**Postdoctoral researcher**, Stochastic drag force theory and scalable model development for multiphase heat transfer, University of Michigan (Advisor: Jesse Capecelatro).
2018 - 2019	**Postdoctoral researcher**, Biomass hopper flows and catalytic fast pyrolysis, National Renewable Energy Laboratory (Managers: Jonathan Stickel and Thomas Foust).
2014 - 2018	**Ph.D. candidate**, Solid particles as a heat transfer fluid in concentrated solar plants, University of Colorado (Advisor: Christine Hrenya).
2012 - 2013	**Undergraduate researcher**, Pyrolysis of lignocellulosic biomass into fuels, University of Washington (Advisor: Fernando Resende).

PUBLICATIONS

1. Wakefield J., Lattanzi A.M., Pecha M., Ciesielski P. & Capecelatro J. 2023 Fast estimation of reaction rates in spherical and non-spherical porous catalysts. *Chemical Engineering Journal*, **454**, 139637. 10.1016/j.cej.2022.139637

2. † ‡ Lattanzi A.M., Tavanashad V., Subramaniam S. & Capecelatro J. 2022 Fluid-mediated sources of granular temperature at finite Reynolds numbers. *Journal of Fluid Mechanics*, **942**, A7. 10.1017/jfm.2022.351

3. Lattanzi A.M., Tavanashad V., Subramaniam S. & Capecelatro J. 2022 Stochastic model for the hydrodynamic force in Euler–Lagrange simulations of particle-laden flows. *Physical Review Fluids*, **7**, 014301 10.1103/PhysRevFluids.7.014301.

4. Beetham S., Lattanzi A.M. & Capecelatro J. 2022 On the thermal entrance length of moderately dense gas-particle flows. *International Journal of Heat and Mass Transfer*, **182**, 121985 10.1016/j.ijheatmasstransfer.2021.121985.

5. Monroe K., Yao Y., Lattanzi A.M., Raghav V. & Capecelatro J. 2021 Role of pulsatility on particle dispersion in expiratory flows. *Physics of Fluids*, **33**, 043311. 10.1063/5.0048746

6. Lattanzi A.M., Tavanashad V., Subramaniam S. & Capecelatro J. 2020 Stochastic models for capturing dispersion in particle-laden flows. *Journal of Fluid Mechanics*, **903**, A7. 10.1017/jfm.2020.625.

7. Ciesielski P., Pecha M., Lattanzi A.M., et al. 2020 Advances in Multiscale Modeling of Lignocellulosic Biomass. *ACS Sustainable Chemistry & Engineering*, **8**, 3512-3531. 10.1021/acssuschemeng.9b07415.

8. Lattanzi A.M., Yin X. & Hrenya C.M. 2020 Heat and momentum transfer to a particle in a laminar, thermal boundary layer. *Journal of Fluid Mechanics*, **889**, A6. 10.1017/jfm.2020.45.

9. Lattanzi A.M., Pecha M., Bharadwaj V. & Ciesielski P. 2020 Beyond the effectiveness factor: Multi-step reactions with intraparticle diffusion limitations. *Chemical Engineering Journal*, **380**, 122507. 10.1016/j.cej.2019.122507.

10. Lattanzi A.M. & Stickel J.J. 2020 Hopper flows of mixtures of spherical and rod–like particles via the multi–sphere method. *AIChE J.*, **66**, e16882. 10.1002/aic.16882.

11. Mishra I., Lattanzi A.M., LaMarche C.Q., Morris A.B. & Hrenya C.M. 2019 Experimental validation of indirect conduction theory and effect of particle roughness on wall-to-particle heat transfer. *AIChE J.*, **65**, e16703. 10.1002/aic.16703.

†Featured as cover image for *Journal of Fluid Mechanics* **942**.

‡Featured as cover image for Modelling approaches and computational methods for particle-laden turbulent flows, edited by Subramaniam S. & Balachandar S. 1st ed. Elsevier.

12. Lattanzi A.M., Yin X. & Hrenya C.M. 2019 A hybrid lattice Boltzmann – random walk method for heat transfer in gas-solids systems. *Journal of Computational Physics: X*, **1**, 100007. 10.1016/j.jcpx.2019.100007.

13. Lattanzi A.M., Yin X. & Hrenya C.M. 2018 An outflow boundary condition for the random walk particle tracking method. *International Journal of Heat and Mass Transfer*, **131**, 604-610. 10.1016/j.ijheatmasstransfer.2018.11.062.

14. Lattanzi A.M. & Hrenya C.M. 2017 Indirect conduction in gas-solids systems: Static vs. Dynamic effects. *AIChE J.*, **63**, 4685-4693. 10.1002/aic.15802.

15. Lattanzi A.M. & Hrenya C.M. 2016 A coupled, multiphase heat flux boundary condition for the discrete element method. *Chemical Engineering Journal*, **304**, 766-773. 10.1016/j.cej.2016.07.004.

BOOKS & CHAPTERS

1. Lattanzi A.M. & Subramaniam S. 2023 Stochastic models, in Modelling approaches and computational methods for particle-laden turbulent flows, edited by Subramaniam S. & Balachandar S. Academic Press, 331–382. 10.1016/B978-0-32-390133-8.00018-9

GRANTS & PROPOSALS

1. (2020) Simulation and modeling of strongly-coupled particle-laden flows
   Role: CO-PI
   Resource: XSEDE allocation on TACC Stampede2
   Result: Awarded CTS200008 (17M CPU-hrs.)

2. (2020) Multi-Step effectiveness factors for non-spherical catalysts
   Role: CO-PI
   Resource: NREL subcontract
   Result: Awarded ($50K)

3. (2020) Effect of pulsatility on expiratory droplet-laden flows
   Role: CO-PI
   Resource: NSF CBET division
   Result: Awarded 2035489 ($222K)

4. (2021) Simulation and modeling of strongly-coupled particle-laden flows
   Role: CO-PI

Resource: XSEDE allocation on TACC Stampede2 & PSC Bridges 2

Result: Awarded CTS200008 Renewal (29M CPU-hrs.)

PROCEEDINGS & PRESENTATIONS

1. **Invited**: "Particle laden flows: Stochastic models & efficient algorithms", *Iowa State University seminar series*, Ames, IA (Feb 2023)
2. "Fluid-mediated sources of granular temperature", *American Physical Society - Division of Fluid Dynamics*, Phoenix, AZ (Nov 2021).
3. "Stochastic modeling of drag forces in particle-laden flows", *NETL multiphase workshop*, Morgantown, WV (Aug 2021).
4. **Invited**: "Stochastic modelling of drag forces in strongly-coupled particle-laden flows ", *EUROMECH Colloquium*, Reykjavik, Iceland (June 2021).
5. **Invited**: "Improved drag formulations for capturing dispersion in strongly-coupled fluid-solid flows", *SIAM - Computational Science & Engineering*, Fort Worth, TX (Mar 2021).
6. "Role of pulsatility on aerosol dispersion in expiratory flows", *American Physical Society - Division of Fluid Dynamics*, Chicago, IL (Nov 2020).
7. "Toward improved heat transfer models for strongly-coupled particle-laden flows", *American Physical Society - Division of Fluid Dynamics*, Chicago, IL (Nov 2020).
8. "Stochastic methods for capturing dispersion in particle-laden flows", *American Physical Society - Division of Fluid Dynamics*, Chicago, IL (Nov 2020).
9. "Stochastic methods for capturing dispersion in particle-laden flows", *American Institute of Chemical Engineers Conference*, San Francisco, CA (Nov 2020).
10. "Clustering of gas-solids flows in a vertical duct", *American Physical Society - Division of Fluid Dynamics*, Seattle, WA (Nov 2019).
11. "Wall-to-particle heat transfer in gas-solids systems", *American Institute of Chemical Engineers Conference*, Pittsburgh, PA (Nov 2018).
12. "Random walk particle tracking for multiphase heat transfer", *American Physical Society - Division of Fluid Dynamics*, Denver, CO (Nov 2017).
13. "A hybrid lattice Boltzmann - random walk method for multiphase heat transfer", *American Institute of Chemical Engineers Conference*, Minneapolis, MN (Oct 2017).
14. "Theory for indirect conduction in gas-solids systems", *American Physical Society - Division of Fluid Dynamics*, Portland, OR (Nov 2016).
15. "A coupled, constant heat flux boundary condition for CFD-DEM", *American Institute of Chemical Engineers Conference*, San Francisco, CA (Nov 2016).

16. "A constant heat flux boundary condition for CFD-DEM simulations", *International Congress of Theoretical and Applied Mechanics*, Montreal, Canada (Aug 2016).

17. "Simulating multiphase heat transfer," *Chemical Engineering Student Annual Research Symposium*, University of Colorado (Oct 2015).

18. **Invited**: "Enhancement of heat transfer for gas-solids flow within a vertical conduit," *National Renewable Energy Laboratory Department of Energy*, (Sep 2015).

TEACHING EXPERIENCE

Particle Technology, CHEN 4650/5650	Role: Advanced TA & secondary lecturer
Spring 2017	39 Students
Multiphase Flow, ME 527	Role: Secondary lecturer
Fall 2019	24 Students

PERSONNEL MENTORED

Graduate Students	
Ipsita Mishra	Ph.D. in chemical engineering at CU
Kendall Hacker	Ph.D. in mechanical engineering at UM
Sarah Beetham	Ph.D. in mechanical engineering at UM (2021)
Jack Wakefield	Ph.D. in applied math at UM (2021)
Max Herzog	Ph.D. in mechanical engineering at UM
Undergraduate Students	
Benjamin Grote	B.S. in chemical engineering CU (2016)
Kalvin Monroe	B.S. in mechanical engineering at UM (2020)

JOURNALS REFEREED

- Physical Review Letters
- Physical Review Fluids
- Physical Review E
- Chemical Engineering Journal
- American Institute of Chemical Engineers
- Granular Matter
- Physics of Fluids