Isaac S. Wheeler

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PUBLICATIONS

1. Wheeler, Isaac S., Ahmad Darwish, Vivek Narsimhan, and Alina A. Alexeenko. n.d. "Mechanistic Models with Experimental Comparison for Microwave-Assisted Lyophilization in a Vial." *Submitted to AAPS Open.*
2. Alexeenko, Alina A., Ahmad Darwish, Drew Strongrich, et al. 2025. "Randomized-Field Microwave-Assisted Pharmaceutical Lyophilization with Closed-Loop Control." *Scientific Reports* 15 (1): 10536. https://doi.org/10.1038/s41598-025-91642-4
3. Wheeler, Isaac S., Vivek Narsimhan, and Alina A. Alexeenko. 2024. "Rarefied Porous Flow in Lyophilization: Review and Open Questions." In "32nd International Symposium on Rarefied Gas Dynamics." Special issue, *32nd International Symposium on Rarefied Gas Dynamics*, 110002. https://doi.org/10.1063/5.0187536
4. Fazzini, Paolo, Marco Montuori, Isaac Stonewall Wheeler, et al. 2024. "Traffic Signal Control with Communicative Deep Reinforcement Learning Agents: A Case Study." November 19. https://doi.org/10.20944/preprints202411.1425.v1
5. Stephens, Victoria B., Sally Jensen, Isaac Wheeler, and David O. Lignell. 2022. "RadLib: A Radiative Property Model Library for CFD." *Computer Physics Communications* 272 (March): 108227. https://doi.org/10.1016/j.cpc.2021.108227

EDUCATION

Brigham Young University, Provo, UT, USA *Jan 2018 - Jul 2021*
B.S., Chemical Engineering
- **3.97/4.0 GPA**, minor in Italian Studies

Purdue University, West Lafayette, IN, USA *Aug 2021 - Present*
PhD, Chemical Engineering

AWARDS

Fulbright Open Study/Research Award, *carried out at Politecnico di Torino* *Oct 2024 - Jul 2025*
Ross Fellowship, *Purdue University recruiting fellowship* *2021-2024*
National Merit Scholarship, *Brigham Young University* *2018-2021*
Utah Regents' Scholarship, *Brigham Young University* *2018-2019*

EXPERIENCE

Lyophilization Modeling, PhD research *West Lafayette, IN, USA*
Davidson School of Chemical Engineering, Purdue University *Aug 2021 - Present*
- Advisors: Dr. Vivek Narsimhan, Dr. Alina A. Alexeenko
- Collaborators: Petr Kazarin, Kyu Yoon, Drew Strongrich, Ahmad Darwish, Anthony Cofer

Fulbright Grantee for Lyophilization Modeling *Torino, TO, Italy*
Dipartimento di Scienza Applicata e Tecnologia, Politecnico di Torino *October 2024 – July 2025*
- Identified and developed a project at the intersection of my skills and existing expertise at PoliTo
- Developed and implemented a population balance model for describing evolution of porous structure
- Wrote Julia code for simplifying model fits to experimental data
- Lyophilized placebo formulations in laboratory and imaged with SEM

LyoSummerSchool 2024 Instructor *West Lafayette, IN, USA*
LyoHUB Demo Facility, Birck Nanotechnology Center *June 10 2024 – June 11 2024*
- Taught 2.5 hours of lectures on mathematical modeling and application to lyophilization cycle design
- Audience: representatives of lyo equipment manufacturers, pharmaceutical companies, and Purdue students

Purdue Graduate Student Senator, representing ChE Students *West Lafayette, IN, USA*
Purdue Graduate Student Government, Purdue University *September 2023 – April 2024*
- Represented ChE grad students in Purdue Graduate Student Senate, in 12 senate meetings using Robert's Rules
- Participated in ChE Graduate Student Organization leadership, organization of annual ChE symposium

Combustion Simulation, undergraduate research *Provo, UT, USA*
Chemical Engineering Department, Brigham Young University *January 2019 – June 2021*

- Advisor: Dr. David Lignell
- Collaborators: Masoomeh Behrang, Kamron Brinkerhoff, Keturah Oldham, Sally Jensen
- Implemented Richardson dispersion calculation for mixing model, assessed statistics
- Combined existing implementations of mixing and soot models to simulate combustion
- Compiled statistics on energy spectra of turbulent mixing model to assess model validity
- Focused on turbulent flow simulation, with primer in radiation and soot formation
- Work largely in command line environment, C++ implementation, Python postprocessing

Traffic Simulation and Optimization, undergraduate research *Rome, RO, Italy*
Consiglio Nazionale Delle Ricerche – Istituto sull'Inquinamento Atmosferico *May 2019 – June 2019*

- Advisor: Dr. Francesco Petracchini
- Collaborators: Dr. Paolo Fazzini, Valeria Rizza, Marco Torre
- Reviewed scientific literature, summarizing 20 articles related to traffic modelling
- Built simple traffic simulator from scratch as a substrate for multi-agent AI development
- Presented preliminary results in Italian to members of CNR-IIA

Italian Oral History Project *Provo, UT; Rome, RO, Italy*
L. Tom Perry Special Collections, Harold B. Lee Library, BYU *January 2019 – December 2019*

- Advisors: Trevor Alvord, Dr. Marie Orton
- Collaborators: Marco Pesci, CJ Passantino, Ethan Bentley
- Developed scope and goals of an oral history project with minimal supervisory input
- Conducted and recorded 22 personal interviews in Rome and Milan in Italian, 4 other interviews in Provo
- Transcribed 7 interviews for library archive, trained another student to take over project

OPEN SOURCE CONTRIBUTIONS

A full list can be found at my GitHub page; highlights here.

LyoPronto.jl: Package author, written to model lyophilization and microwave-assisted lyophilization processes

Plots.jl: PR #5098, improving support for unit-aware plotting

Unitful.jl: PR #795, migrating an extension for LaTeX unit printing and rendering online documentation

TransformVariables.jl: PR #128, refactoring scalar transforms

DataInterpolations.jl: PR #366 and PR #380, accommodating dimensional quantities in interpolations

OrdinaryDiffEq.jl: PR #2554, error messages related to imports; PR #2698, improving type stability for DAE solvers

REFERENCES

Prof. Vivek Narsimhan | Associate Professor
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Prof. Davide Fissore
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