Joshua Pulsipher, Ph.D.

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Degrees

2017 – 2022 **Ph.D. in Chemical & Biological Engineering**
University of Wisconsin-Madison (Madison, WI)
Advisor: Prof. Victor M. Zavala
Thesis: Infinite-Dimensional Optimization: Modeling Abstractions and Software

2012 – 2017 **B.Sc. in Chemical Engineering**
Brigham Young University (Provo, UT)
Advisor: Prof. John D. Hedengren
Focus: Process Systems Engineering & UAV-Based Infrastructure Monitoring

Relevant Employment History

2023 – Present **Assistant Professor**
Chemical Engineering, University of Waterloo (Waterloo, ON, Canada)
Areas: Data-Driven Decision-Making, Machine Learning, Process Systems, Sustainability

2022 – 2023 **Post-Doctoral Associate**
Chemical Engineering, Carnegie Mellon University (Pittsburgh, PA)
Advisors: Profs. Carl D. Laird and Ignacio E. Grossmann
Areas: Data-Driven Decision-Making, Rare Earth Elements, Disease Control, Process Systems

2017 – 2022 **Graduate Research Assistant**
Chemical & Biological Engineering, University of Wisconsin-Madison (Madison, WI)
Areas: Decision-Making under Uncertainty, Machine Learning, Advanced Control, Energy Systems

2020 **Applications Engineering Research Intern**
Differentiating Technologies, ExxonMobil Research & Engineering (Spring, TX)
Developed cognitive computer vision sensing framework (patented)

2019 **Research Intern**
Optimization & Control, Pacific Northwest National Laboratory (Richland, WA)
Innovated uncertainty propagation analysis for power grid operation

Funded Research Proposals

2025 – 2027 *ORF-RI: CPU-GPU Accelerated Optimal Process Design and Control to Rigorously Model Space-Time*, Government of Ontario, **$80,000**, Role: Principle Investigator

CFI-JELF: CPU-GPU Accelerated Optimal Process Design and Control to Rigorously Model Space-Time, Canada Foundation for Innovation, **$80,000**, Role: Principle Investigator

2024 – 2029 *Global Centre: CIRCLE - Center for Innovative Recycling and Circular Economy*, Natural Sciences and Engineering Research Council of Canada, **$2,452,500**, Role: Co-Principle Investigator (14% share, co-lead for the Canadian team)

2024 – 2027 *Alliance: Development and Application of a Generalized Adaptive Model for Large Conditioned Spaces*, Natural Sciences and Engineering Research Council of Canada and the City of Waterloo, **$288,750**, Role: Co-Principle Investigator (30% share)

2024 – 2029 *Discovery: Advancing Optimal Process Design and Control to Rigorously Model Space-Time*, Natural Sciences and Engineering Research Council of Canada, **$167,500**, Role: Principle Investigator)

2022 – 2023 *Multi-Enterprise REE/CM Network Optimization*, U.S. Department of Energy (subcontracted via KeyLogic Systems, Inc.), **$727,000**, Role: Senior Personnel (contributed to writing and scoping of the project proposal)

2016 – 2017 *Optimal UAV-Based Infrastructure Monitoring*, U.S. National Science Foundation, **$14,000**, Role: Undergraduate Recipient (scoped and wrote the proposal for funding)

Honors and Awards

- **Best Presentation Award**, JuMP-dev 2024 Workshop (2024)
- **Keynote Speaker**, Great Lakes Process Systems Engineering Student Workshop (2024)
- **Travel Award**, Foundations of Computer Aided Process Operations / Chemical Process Control (2023)
- **Plenary Speaker**, Computing & Systems Technology Division Plenary Session of the AICHE Annual Meeting (2022)
- **Undergraduate Research Fellowship**, National Science Foundation (2016)
- **Full Academic Scholarship**, Brigham Young University (2013 – 2017)
- **Academic Scholarship**, Brigham Young University Chemical Engineering Department (2012)
- **Masonic Academic Achievement Scholarship**, Yakima Masonic Lodge (2012)
- **Eagle Scout**, Boy Scouts of America (2012)
- **President's List**, Yakima Valley Community College (2011 – 2012)

Research Publications

Journal Articles

15 González, L. D., **Pulsipher**, **J. L.**, Jiang, S., Soderstrom, T., and Zavala, V. M. (2025). "A Digital Twin Simulator of a Pastillation Process with Applications to Automatic Control based on Computer Vision". *Under Review*. URL: https://www.arxiv.org/abs/2503.16539.

14 Ovalle, D., Mazzadi, S., Laird, C. D., Grossmann, I. E., and **Pulsipher**, **J. L.** (2025). "Event Constrained Programming". *Under Review*. URL: https://arxiv.org/abs/2501.06353.

13 Roth, T., Mazzadi, S., **Pulsipher**, **J. L.**, and Ricardez-Sandoval, L. (2025). "Enhancing Sustainable Agriculture Through Optimized Polyculture Hydroponic Operating Strategies". *Under Review*.

12 Casas, C. A. E., Ricardez-Sandoval, L. A., and **Pulsipher**, **J. L.** (July 2025). "A Comparison of Strategies to Embed Physics-Informed Neural Networks in Nonlinear Model Predictive Control Formulations Solved via Direct Transcription". In: *Computers & Chemical Engineering*. URL: https://doi.org/10.1016/j.compchemeng.2025.109105.

11 Gondosiswanto, E. and **Pulsipher**, **J. L.** (June 2025). "Advances to Modelling and Solving Infinite-Dimensional Optimization Problems in InfiniteOpt.jl". In: *Digital Chemical Engineering*. Emerging Stars in Digital Chemical Engineering II Special Issue. URL: https://doi.org/10.1016/j.dche.2025.100236.

10 Ovalle, D., **Pulsipher**, **J. L.**, Ye, Y., Harshbarger, K., Bury, S., Laird, C. D., and Grossmann, I. E. (Apr. 2025). "Optimal reactive operation of general topology supply chain and manufacturing networks under disruptions". In: *AICHE Journal*. URL: https://doi.org/10.1002/aic.18833.

9 Ammari, B. L., Johnson, E. S., Stinchfield, G., Kim, T., Bynum, M., Hart, W. E., **Pulsipher**, **J. L.**, and Laird, C. D. (July 2023). "Linear Model Decision Trees as Surrogates in Optimization of Engineering Applications". In: *Computers & Chemical Engineering*. URL: https://doi.org/10.1016/j.compchemeng.2023.108347.

8. **Pulsipher, J. L.**, Coutinho, L. D., Soderstrom, T. A., and Zavala, V. M. (Aug. 2022). "SAFE-OCC: A Novelty Detection Framework for Convolutional Neural Network Sensors and its Application in Process Control". In: *Journal of Process Control* 117, pp. 78–97. URL: https://doi.org/10.1016/j.jprocont.2022.07.006.

7. **Pulsipher, J. L.**, Davidson, B. R., and Zavala, V. M. (Aug. 2022). "Random Field Optimization". In: *Computers & Chemical Engineering* 165. URL: https://doi.org/10.1016/j.compchemeng.2022.107854.

6. **Pulsipher, J. L.**, Zhang, W., Hongisto, T. J., and Zavala, V. M. (Jan. 2022). "A unifying modeling abstraction for infinite-dimensional optimization". In: *Computers & Chemical Engineering* 156. URL: https://doi.org/10.1016/j.compchemeng.2021.107567.

5. **Pulsipher, J. L.** and Zavala, V. M. (Feb. 2020). "Measuring and optimizing system reliability: a stochastic programming approach". In: *Top* 28.3, pp. 626–645. URL: https://doi.org/10.1007/s11750-020-00550-5.

4. **Pulsipher, J. L.** and Zavala, V. M. (Sept. 2019). "A scalable stochastic programming approach for the design of flexible systems". In: *Computers & Chemical Engineering* 128, pp. 69–76. URL: https://doi.org/10.1016/j.compchemeng.2019.05.033.

3. **Pulsipher, J. L.**, Rios, D., and Zavala, V. M. (July 2019). "A computational framework for quantifying and analyzing system flexibility". In: *Computers & Chemical Engineering* 126, pp. 342–355. URL: https://doi.org/10.1016/j.compchemeng.2019.04.024.

2. **Pulsipher, J. L.** and Zavala, V. M. (Nov. 2018). "A mixed-integer conic programming formulation for computing the flexibility index under multivariate gaussian uncertainty". In: *Computers & Chemical Engineering* 119, pp. 302–308. URL: https://doi.org/10.1016/j.compchemeng.2018.09.005.

1. Martin, R. A., Blackburn, L., **Pulsipher, J. L.**, Franke, K., and Hedengren, J. D. (May 2017). "Potential benefits of combining anomaly detection with view planning for UAV infrastructure modeling". In: *Remote Sensing* 9.5, p. 434. URL: https://doi.org/10.3390/rs9050434.

Dissertations

1. **Pulsipher, J. L.** (Feb. 2022). "Infinite-Dimensional Optimization: Modeling Abstractions and Software". PhD thesis. University of Wisconsin-Madison. URL: https://www.proquest.com/dissertations-theses/infinite-dimensional-optimization-modeling/docview/2626931431/se-2.

Conference Proceedings (Peer Reviewed)

7. Bhatia, A., Varela, D. O., **Pulsipher, J. L.**, Zamarripa, M. A., Drouven, M. G., Grossmann, I., and Laird, C. D. (July 2024). "A Computational Framework for Optimizing and Evaluating Critical Mineral Opportunities in Produced Water Networks". *Foundations of Computer-aided Process Design*.

6. **Pulsipher, J. L.** and Shin, S. (2024). "Scalable Modeling of Infinite-Dimensional Nonlinear Programs with InfiniteExaModels.jl". *Computer Aided Chemical Engineering*. Vol. 53. Elsevier, pp. 3373–3378. URL: https://doi.org/10.1016/B978-0-443-28824-1.50563-9.

5. Xavier, P. M., Ripper, P., **Pulsipher, J. L.**, Garcia, J. D., Maculan, N., and Neira, D. E. B. (2024). "Disjunctive Programming meets QUBO". *Computer Aided Chemical Engineering*. Vol. 53. Elsevier, pp. 3433–3438. URL: https://doi.org/10.1016/B978-0-443-28824-1.50573-1.

4. Ovalle, D., **Pulsipher, J. L.**, Gomez, C., Gomez, J. M., Laird, C. D., Drouven, M., and Grossmann, I. E. (June 2023). "Study of Different Formulations for the Multiperiod Blending Problem Applied to Lithium Recovery from Produced Water". *33rd European Symposium on Computer Aided Process Engineering*. URL: https://doi.org/10.1016/B978-0-443-15274-0.50295-X.

3. Ammari, B. L., Meraklı, M., Kompalli, S., Qian, Y., **Pulsipher, J. L.**, Bynum, M., Furman, K. C., and Laird, C. D. (Jan. 2023). "Computational Performance of Algebraic Modeling Languages with Alternate Solver Interfaces and Advanced Modeling Components". *Foundations of Computer Aided Process Operations / Chemical Process Control 2023*.

2. **Pulsipher, J. L.**, Ovalle, D., Perez, H. D., Laird, C. D., and Grossmann, I. E. (Jan. 2023). "Characterizing Event Constraints with Generalized Disjunctive Programming". *Foundations of Computer Aided Process Operations / Chemical Process Control 2023*.

1. **Pulsipher, J. L.**, Davidson, B. R., and Zavala, V. M. (2022). "New Measures for Shaping Trajectories in Dynamic Optimization". *13th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems*. Vol. 55. 7. IFAC PapersOnLine, pp. 495–500. URL: https://doi.org/10.1016/j.ifacol.2022.07.492.

Book Chapters

2. **Pulsipher, J. L.**, Cole, D. L., Jalving, J., and Zavala, V. M. (n.d.). "Optimization in Chemical and Biological Engineering Using Julia". *Introduction to Software for Chemical Engineers*. CRC Press, pp. 774–806.

1. Jiang, S., Qin, S., **Pulsipher, J. L.**, and Zavala, V. M. (2024). "Convolutional neural networks: Basic concepts and applications in manufacturing". *Artificial Intelligence in Manufacturing*. Elsevier, pp. 63–102. URL: https://doi.org/10.1016/B978-0-323-99134-6.00007-4.

Patents

1. Kadam, J. V., Georgiou, A. T., Sheth, K. R., Li, W., Onel, O., and **Pulsipher, J. L.** (Nov. 2022). "Systems and Methods of Monitoring and Controlling an Industrial Process". U.S. Patent 11513496.

Newsletter Articles (Peer Reviewed)

1. **Pulsipher, J. L.** and Zavala, V. M. (Mar. 2022). "InfiniteOpt.jl: A Julia Package for Infinite-Dimensional Optimization". Vol. 17. 1. International Federation of Operational Research Societies. URL: https://www.ifors.org/newsletter/ifors-news-march-2022.pdf.

Software

- **InfiniteOpt.jl:** An Infinite-Dimensional Modeling Framework (Julia)
  Role: Lead Developer
  Source: https://github.com/infiniteopt/InfiniteOpt.jl
- **DisjunctiveProgramming.jl:** A Modeling Framework for Discrete Decision-Making via GDP (Julia)
  Role: Developer
  Source: https://github.com/hdavid16/DisjunctiveProgramming.jl
- **OMLT:** A Framework for Embedding ML Models in Optimization Problems (Python)
  Role: Developer
  Source: https://github.com/cog-imperial/OMLT
- **FlexibilityAnalysis.jl:** A Framework for Flexibility Analysis (Julia)
  Role: Lead Developer
  Source: https://github.com/pulsipher/FlexibilityAnalysis.jl
- **compvislab:** A Toolbox for Computer Vision Control (Python)
  Role: Lead Developer
- **Volare:** Optimized Flight Planner for UAV Inspection (Android)
  Role: Developer

Research Presentations

Invited Talks

24. Pulsipher, J. L. a. (Mar. 2025). "GPU-Accelerated Process Automation". *18th INFORMS Computing Society (ICS) Conference*. Toronto, ON.

23. **Pulsipher, J. L.** (Jan. 2025). "GPU-Accelerated Process Automation". *Process Intensification Challenges and Opportunities: Towards Sustainable Chemical Processes in the XXI Century*. Online.

22. **Pulsipher, J. L.** (Dec. 2024). "IPSE Group: Accelerating the Solution of Infinite-Dimensional Optimization Problems". *Autodesk*. Online.

21. Drgona, J., Gunnell, L., **Pulsipher, J. L.**, and Hedengren, J. (July 2024). "Tackling Control Problems with Open-Source Software in Julia and Python". *American Control Conference*. Toronto, ON.

20. **Pulsipher, J. L.** (June 2024). "InfiniteOpt.jl: Accelerating and Innovating Infinite-Dimensional Optimization". *University of Surrey School of Chemistry and Chemical Engineering Seminar*. Guildford, UK.

19. **Pulsipher, J. L.** (May 2024). "Stochastic Programming Inspired Modelling Approaches for Dynamic Optimization". *Great Lakes Process Systems Engineering Student Workshop*. Buffalo, NY, USA.

18. **Pulsipher, J. L.** (Apr. 2023). "Stochastic Programming Inspired Modeling Techniques for Shaping Dynamic Trajectories". *IEEE TC Process Control Online Seminar Series*. Online.

17. **Pulsipher, J. L.** (Feb. 2023). "Optimization under Uncertainty: From Data to Models to Decision-Making". *University of South Florida Chemical, Biological and Materials Engineering Department Seminar*. Tampa, FL.

16. **Pulsipher, J. L.** (Jan. 2023). "Optimization under Uncertainty: From Data to Models to Decision-Making". *University of Waterloo Chemical Engineering Department Seminar*. Waterloo, Canada.

15. **Pulsipher, J. L.** (Jan. 2023). "Optimization under Uncertainty: From Data to Models to Decision-Making". *Rensselaer Polytechnic Institute Chemical and Biological Engineering Department Seminar*. Troy, NY.

14. **Pulsipher, J. L.** (Jan. 2023). "Optimization under Uncertainty: From Data to Models to Decision-Making". *Brigham Young University Chemical Engineering Department Seminar*. Provo, UT.

13. **Pulsipher, J. L.**, Ovalle, D., Perez, H. D., Laird, C. D., and Grossmann, I. E. (Jan. 2023). "Characterizing Event Constraints with Generalized Disjunctive Programming". *Foundations of Computer Aided Process Operations / Chemical Process Control 2023*. San Antonio, TX.

12. **Pulsipher, J. L.** (Nov. 2022). "An Introduction to Process Systems Engineering with Applications in Energy and Disease Control". *University International Seminar at Universidad Nacional Micaela Bastidas de Apurímac*. Apurímac, Peru.

11. **Pulsipher, J. L.**, Laird, C. D., and Grossmann, I. E. (Nov. 2022). "Event Constrained Optimization". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. **Computing & Systems Technology Division Plenary**. Phoenix, AZ.

10. **Pulsipher, J. L.** and Laird, C. D. (Oct. 2022). "Advances In Solving Infinite-dimensional Optimization Problems With Infiniteopt.jl". *The Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*. Indianapolis, IN.

9. **Pulsipher, J. L.** (Sept. 2022). "Software-Accelerated Theoretical Discovery via InfiniteOpt.jl". *Carnegie Mellon University Process Systems Engineering Seminar*. Pittsburgh, PA.

8. **Pulsipher, J. L.**, Davidson, B. R., and Zavala, V. M. (July 2022). "Random Field Optimization". *International Conference on Continuous Optimization (ICCOPT)*. Bethlehem, PA.

7. **Pulsipher, J. L.**, Coutinho, L., and Zavala, V. M. (June 2022). "Computer Vision Aided Process Control: Methods for Enhanced Autonomy and Robustness". *Advanced Manufacturing & Processing Conference (AMPc)*. Bethesda, MD.

6. **Pulsipher, J. L.** and Laird, C. D. (June 2022). "Data-Driven Surrogates for Infinite-Dimensional Optimization Problems". *CORS/INFORMS International Conference*. Vancouver, Canada.

5. **Pulsipher, J. L.**, Zhang, W., and Zavala, V. M. (Feb. 2021). "InfiniteOpt.jl: A unifying abstraction for Infinite-Dimensional Optimization". *The Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*. Anaheim, CA.

4. **Pulsipher, J. L.**, Zhang, W., and Zavala, V. M. (Feb. 2021). "Tackling Infinite-Dimensional Optimization Problems with InfiniteOpt.jl". *Texas-Wisconsin-California Control Consortium (TWCCC) Semi-Annual Meeting*. Online.

3. **Pulsipher, J. L.**, Zhang, W., and Zavala, V. M. (Nov. 2020). "Modeling Infinite-Dimensional Optimization Problems with InfiniteOpt.jl". *The Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*. Online.

2. **Pulsipher, J. L.** and Zavala, V. M. (Oct. 2020). "Modeling Infinite-Dimensional Optimization Problems with InfiniteOpt.jl". *UW-Madison Chemical & Biological Engineering Computational Seminar Series*. Madison, WI.

1. **Pulsipher, J. L.** and Zavala, V. M. (Oct. 2019). "Engineering Optimal Systems". *UW-Madison Undergraduate Seminar Series*. Madison, WI.

Other Talks

20. **Pulsipher, J. L.**, Casas, C. E., and Ricardez-Sandoval, L. (Nov. 2024). "Benchmarking Surrogate Embedding Strategies for Model Predictive Control". *American Institute of Chemical Engineering Annual Meeting*. San Diego, CA, USA.

19. **Pulsipher, J. L.** and Shin, S. (Nov. 2024). "InfiniteExaModels.jl: Accelerating Infinite-Dimensional Optimization Problems on CPU & GPU". *American Institute of Chemical Engineering Annual Meeting*. San Diego, CA, USA.

18. **Pulsipher, J. L.**, Casas, C. E., and Ricardez-Sandoval, L. (Oct. 2024). "Model Predictive Control with Physics-Informed Neural Networks: A Comparison of Surrogate Embedding Strategies". *74th Canadian Chemical Engineering Conference*. Toronto, ON.

17. **Pulsipher, J. L.** and Perez, H. (July 2024). "The New DisjunctiveProgramming.jl". *JuMP-dev 2024 Workshop*. Montreal, QC.

16. **Pulsipher, J. L.** and Shin, S. (July 2024). "InfiniteExaModels.jl: Accelerating Infinite-Dimensional Optimization Problems on CPU & GPU". *JuMP-dev 2024 Workshop*. Montreal, QC.

15. **Pulsipher, J. L.** and Shin, S. (June 2024). "Scalable Modeling of Infinite-Dimensional Nonlinear Programs with InfiniteExaModels.jl". *34th European Symposium on Computer Aided Process Engineering / 15th International Symposium on Process Systems Engineering (ESCAPE34/PSE24)*. Florence, Italy.

14. **Pulsipher, J. L.**, Ovalle, D., Laird, C., and Grossmann, I. (Nov. 2023). "Advanced Solution Techniques for Event Constrained Programming". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Orlando, FL.

13. **Pulsipher, J. L.** (Aug. 2023). "Stochastic Programming Inspired Modeling Techniques for Shaping Dynamic Trajectories". *Modeling and Optimization: Theory and Applications (MOPTA)*. Bethlehem, PA.

12. **Pulsipher, J. L.** (July 2023). "Recent Progress on InfiniteOpt.jl and DisjunctiveProgramming.jl". *JuMP-dev*. Cambridge, MA.

11. **Pulsipher, J. L.**, Ovalle, D., Perez, H., Grossmann, I. E., and Laird, C. D. (Mar. 2023). "Generalized Disjunctive Programming Formulations for Event Constraints". *Center for Advanced Process Decision-making (CAPD) Annual Meeting*. Pittsburgh, PA.

10. **Pulsipher, J. L.**, Coutinho, L., and Zavala, V. M. (Nov. 2022). "Computer Vision Aided Process Control: Methods for Enhanced Autonomy and Robustness". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Phoenix, AZ.

9. **Pulsipher, J. L.**, Davidson, B. R., and Zavala, V. M. (Nov. 2022). "New Measures for Shaping Trajectories in Dynamic Optimization". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Phoenix, AZ.

8. **Pulsipher, J. L.** (July 2022). "Advances in Transformations and NLP Modeling for InfiniteOpt.jl". *Julia-Con*. Online.

7. **Pulsipher, J. L.**, Davidson, B. R., and Zavala, V. M. (June 2022). "New Measures for Shaping Trajectories in Dynamic Optimization". *IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (DYCOPS)*. Busan, South Korea.

6. **Pulsipher, J. L.** and Zavala, V. M. (Nov. 2021). "Random Field Optimization". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Boston, MA.

5. **Pulsipher**, **J. L.**, Zhang, W., and Zavala, V. M. (Nov. 2021). "InfiniteOpt.jl: A Unifying Abstraction for Infinite-Dimensional Optimization". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Boston, MA.
4. **Pulsipher**, **J. L.**, Zhang, W., and Zavala, V. M. (July 2021). "InfiniteOpt.jl: A JuMP Extension for Tackling Infinite-Dimensional Optimization Problems". *Julia-Con*. Online.
3. **Pulsipher**, **J. L.**, Zhang, W., and Zavala, V. M. (Nov. 2020). "Modeling Infinite-Dimensional Optimization Problems with InfiniteOpt.jl". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Online.
2. **Pulsipher**, **J. L.** and Zavala, V. M. (Nov. 2019). "A Scalable Stochastic Programming Approach for Designing Flexible Systems". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Orlando, FL.
1. **Pulsipher**, **J. L.** and Zavala, V. M. (Nov. 2018). "A Mixed-Integer Conic Programming Formulation for Computing the Flexibility Index Under Multivariate Gaussian Random Variables". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Pittsburgh, PA.

Short Courses

5. **Pulsipher**, **J. L.** (July 2024). "Optimal Control in Julia with JuMP and InfiniteOpt". *The 12th IFAC Symposium on Advanced Control of Chemical Processes (ADCHEM 2024)*. Toronto, ON.
4. **Pulsipher**, **J. L.** (May 2023). "Modeling with Julia and JuMP". *Pan-American Advanced Studies Institute on Optimization and Data Science for Net-Zero Carbon and Sustainability (PASI)*. Buenos Aires, Argentina.
3. **Pulsipher**, **J. L.** (June 2022). "InfiniteOpt.jl: A Julia Package for Infinite-Dimensional Optimization". *IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (DYCOPS)*. Busan, South Korea.
2. **Pulsipher**, **J. L.** (May 2022). "InfiniteOpt.jl: A Julia Package for Infinite-Dimensional Optimization". *Carnegie Mellon University*. Pittsburg, PA.
1. **Pulsipher**, **J. L.** (Jan. 2022). "Julia: A Crash Course". *University of Wisconsin-Madison*. Madison, WI.

Posters

10. Ammari, B. L., Johnson, E. S., Stinchfield, G., Kim, T., Bynum, M., Hart, W. E., **Pulsipher**, **J. L.**, and Laird, C. D. (July 2023). "Optimization in Engineering with Embedded Linear Model Decision Trees". *Modeling and Optimization: Theory and Applications (MOPTA)*. Davis, CA.
9. **Pulsipher**, **J. L.**, Ovalle, D., Perez, H., Grossmann, I. E., and Laird, C. D. (Mar. 2023). "Generalized Disjunctive Programming Formulations for Event Constraints". *Center for Advanced Process Decision-making (CAPD) Annual Meeting*. Pittsburgh, PA.
8. **Pulsipher**, **J. L.** (Nov. 2022). "Decision-Making and Learning Under Uncertainty for Complex Systems". *The American Institute of Chemical Engineering (AICHE) Annual Meeting*. Phoenix, AZ.
7. Kompalli, S., Merakli, M., Ammari, B. L., **Pulsipher**, **J. L.**, Qian, Y., Bynum, M. L., Furman, K. C., and Laird, C. D. (Sept. 2022). "Computational Performance of Algebraic Modeling Languages with Alternate Solver Interfaces and Advanced Modeling Components". *Enterprise-Wide Optimization (EWO) Annual Meeting*. Pittsburgh, PA.
6. **Pulsipher**, **J. L.**, Grossmann, I. E., Laird, C. D., and Zavala, V. M. (June 2022). "InfiniteOpt.jl: A Framework for Tackling Infinite-Dimensional Optimization Problems". *Advanced Manufacturing & Processing Conference (AMPc)*. Bethesda, MD.
5. **Pulsipher**, **J. L.**, Grossmann, I. E., Laird, C. D., and Zavala, V. M. (Mar. 2022). "InfiniteOpt.jl: A Framework for Tackling Infinite-Dimensional Optimization Problems". *Center for Advanced Process Decision-making (CAPD) Annual Meeting*. Pittsburgh, PA.
4. **Pulsipher**, **J. L.** (Sept. 2021). "InfiniteOpt.jl: A Unifying Abstraction for Infinite-Dimensional Optimization". *LatinXChem*. Twitter.

3. **Pulsipher**, **J. L.** and Zavala, V. M. (Sept. 2018). "Analyzing and Quantifying the Flexibility of Complex Systems". *Machine Learning and Optimization Research (MOR) Meeting*. Madison, WI.

2. **Pulsipher**, **J. L.** and Zavala, V. M. (Sept. 2018). "Measures of System Resilience and Flexibility". *Texas-Wisconsin-California Control Consortium (TWCCC) Semi-Annual Meeting*. Madison, WI.

1. Martin, R. A., **Pulsipher**, **J. L.**, Lund, C., Clark, J., Franke, K., and Hedengren, J. D. (Aug. 2013). "UAV-Based Infrastructure Monitoring". *Center for Unmanned Aircraft Systems (C-UAS) Annual Meeting*. Snowbird, UT.

Research Mentoring

PhD Students

2025 – Present
- **Daniele Palladino,** University of Waterloo
- **Shawn Benedict,** University of Waterloo
- **Shayesteh Dolatabadi,** University of Waterloo

2024 – Present
- **Fateme Mohammadi,** University of Waterloo

Master's Students

2025 – Present
- **Daniel Fonseca Cerrato,** University of Waterloo
- **Daniel Nguyen,** University of Waterloo
- **Manvir Banwait,** University of Waterloo

2024 – Present
- **Evelyn Gondosiswanto,** University of Waterloo
- **Stefan Mazzadi,** University of Waterloo

2023 – 2024
- **Carlos Andres Elorza Casas,** University of Waterloo, Now at Solex Thermo Science

2023 – 2023
- **Louis Tobergte,** Carnegie Mellon University, Now at West Point

2022 – 2023
- **Sai Kompalli,** Carnegie Mellon University, Now at Purdue University
- **Shumeng Lin,** Carnegie Mellon University, Now at NETL

2022 – 2022
- **Yicheng Xi,** Carnegie Mellon University
- **Yufeng Qian,** Carnegie Mellon University, Now at University of Pittsburgh

Undergraduate Students

2025 – 2025
- **Manal Kahn,** University of Waterloo
- **Vivek Kapur,** University of Waterloo
- **Tami Ogunleye,** University of Waterloo
- **Sammy Juvatopolos,** University of Waterloo

2024 – 2025
- **Simon Nguyen,** University of Waterloo
- **Mohammad Shahwan,** University of Waterloo

2023 – 2024
- **Stefan Mazzadi,** University of Waterloo

2021 – 2022
- **Baide Xue,** University of Wisconsin-Madison, Now at Pyran

2019 – 2022
- **Benjamin R. Davidson,** University of Wisconsin-Madison, Now at ExxonMobil

2020 – 2021
- **Luke D. J. Coutinho,** University of Wisconsin-Madison, Now at Koch Industries
- **Tyler J. Hongisto,** University of Wisconsin-Madison, Now at Proctor & Gamble

2018 – 2018
- **Daniel Rios,** University of Wisconsin-Madison, Now at Texas Instruments

Courses Taught

- **CHE 500:** Data Science and Machine Learning for Chemical Engineers
  Academic Terms: Winter 2026
- **CHE 322:** Numerical Methods for Process Analysis and Design
  Academic Terms: Winter 2025
- **CHE 341:** Introduction to Process Control
  Academic Terms: Winter 2024
- **CHE 521:** Process Optimization
  Academic Terms: Fall 2024, Fall 2026

Research Collaborators (Past 3 Years)

Universities

CMU	Carl Laird, Ignacio Grossmann, Ana Torres, Coty Jen, Lorenz Biegler (Chemical Eng.)
JCVI	Tae Seok Moon
MIT	Sungho Shin (Chemical Eng.)
NCSU	Kai Lan (Sustain. Sc. & Eng.)
Purdue	David Bernal (Chemical Eng.)
Tufts	Christos Georgakis (Chemical Eng.)
Queens	Warren Mabee (Geo. & Planning)
UFRJ (Brazil)	Argimiro Secchi (Chemical Eng.)
UNS (Argentina)	Soledad Diaz (Chemical Eng.)
UWaterloo	Luis Ricardez-Sandoval, Valerie Ward, Christian Euler, Marc Aucoin, Hector Budman, Tizazu Mekonnen, Yilan Liu, Nasser Abukhdeir (Chemical Eng.), Elizabeth Weckman, Vinny Gupta (Mech. Eng.), Trevor Charles (Biology)
UW-Madison	Victor Zavala (Chemical & Biological Eng.)

National Laboratories

Argonne	Mihai Anitescu, Sungho Shin (Mathematics & Computer Science)
Sandia	Michael Bynum, Bill Hart, Emma Johnson (Discrete Math & Optimization)
NETL	Miguel Zamarripa, Markus Drouven, Philip Tominac (Process Systems Eng.)

Industry

ExxonMobil	Tyler Soderstrom (Online Optimization & Control), Merve Merakli, Kevin Furman (Data & Decision Sciences)
City of Waterloo	Sunda Siva, Scott Prevost
Compass Minerals	Andrej Budovic, Wayne McConnell

Service

Scientific

- **Session Organizer,** ACC 2024 (Tackling Control Problems with Open-Source Software in Julia and Python), MOPTA 2023 (Advanced Decomposition and Hybrid Strategies for Optimization under Uncertainty), INFORMS 2021 (Julia Packages for the Modeling and Solution of Optimization Problems)

- **Conference Organizer,** Great Lakes PSE Workshop 2024, JuMP-dev 2024, Pan-American Advanced Studies Institute on Optimization and Data Science for Net-Zero Carbon and Sustainability 2023, Great Lakes PSE Workshop 2023, JuMP-dev 2023
- **Committee Member,** UWaterloo Engineering Computing Committee (2023 – Present), UWaterloo Chemical Engineering Undergraduate Review Committee (2023 – Present), UWaterloo Department of Chemical Engineering Chair reappointment committee (2024 – 2025)
- **Organizing Committee Member,** UW-Madison CBE Computing Seminar Series (2020 – 2021)
- **Graduate Exam Committees,** Ittisak Promma PhD Defense (2025), Shuji Chang Comprehensive Exam (2024), Mohammad Aghaee Foroushani PhD Defense (2024),
- **Treasurer,** UW-Madison Chemical Engineering Graduate Student Association (2020 – 2021)
- **Session Chair,** AICHE 2025, JuMP-dev 2024, AICHE 2024, ACC 2024, AICHE 2023, MOPTA 2023, INFORMS 2022, DYCOPS 2022, CORS/INFORMS 2022, INFORMS 2021
- **Journal Reviewer,** Digital Chemical Engineering, Computers & Chemical Engineering, AICHE Journal, Chemical Engineering Science, IEEE Transactions on Control Systems Technology, Canadian Journal of Chemical Engineering, Latin American Applied Research, International Federation of Automatic Control, Industrial & Engineering Chemistry Research
- **External Grant Reviewer,** German Research Foundation, Natural Sciences and Engineering Research Council of Canada
- **Volunteer,** UWaterloo 2024 Fall Open House, Faculty of Engineering Virtual Outreach, Outreach at Brantford Collegiate Institute, UWaterloo 2023 Fall Open House, 2023 ChemE Amazing Race

Community

- **Volunteer Leader,** LDS Church - Spanish Speaking (2019 – Present)
- **Volunteer,** LDS Church (2016 – Present)
- **Volunteer Missionary,** Peru Trujillo Mission - Spanish Speaking (2014 – 2016)
- **Volunteer,** Elderly Chore Services in Yakima, WA (2010 – 2012)
- **Volunteer Instructor,** Swim Lessons for All Project (2012)

Skills

Languages	Fluent in English and Spanish
Coding	Julia, Python, C, C++, Java, MATLAB, VBA, Bash, Android, Git, LaTeX, …
Web Dev	HTML, CSS, JavaScript, Markdown, Liquid, Jekyll
Modeling	JuMP, AMPL, Pyomo, Gekko, Simulink, Aspen, PyTorch, Keras, Flux