

Caleb Miller

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Summary

Second year PhD student studying computational nuclear engineering at the University of Texas specializing in multi-physics simulation and scientific software development. Advised by [Dr. Kevin Clarno](#) and a member of the [Molten Salt Reactor Digit Twin Initiative](#). Majority of research experience to date has been centered on the development of a thermal hydraulics code that is being coupled to neutronics software to model molten salt reactors with high fidelity.

Education

University of Texas at Austin

PhD in Mechanical Engineering, GPA: 3.7/4.0

Expected May 2027

Relevant Coursework: *Numerical Analysis Differential Equations, Numerical Analysis Linear Algebra, Reactor Theory, Dynamics of Turbulent Flow*

University of Texas at Austin

Bachelors of Science in Physics, GPA: 3.6/4.0

December 2022

Research Experience

Graduate Research Assistant and Associate Engineering Scientist

Austin, TX

University of Texas

January 2023 – Present

- Contributor to a 1D finite volume system thermal hydraulics code based in C++ and Python
- Introduced time dependence and transient modeling using implicit methods
- Developed a method to replicate the 2D core flow distribution of a reactor within a 1D framework
- Performed benchmarking and validation comparing to analytic solutions
- Implemented mass, momentum, and scalar transport solvers in C++ and PETSc
- Helped develop a coupling interface with neutronics code for multi-physics simulations
- Contributed to a large codebase utilizing Git and GitHub for version control, performing pull requests, conducting code reviews, and managing merge conflicts
- Simulated nuclear depletion using ORIGEN to assist in the design of a fueled molten salt experiment

Publications

Conference Papers

- Miller, C., Collins, B., Clarno, K (2024). Manipulating Forms Loss Coefficients to Correct Channel Flow Distribution. *ANS Transactions* (Accepted).

Technical Skills

Languages: C++, Python, Bash, CMake

Software: Git, ORIGEN (Nuclear Depletion), MCNP (Nuclear Criticality Calculations)

Mathematics: Numerical Methods for ODEs and PDEs, Linear Algebra, Finite Volume Methods

Service and Awards

Cockrell School of Engineering Multi-Year Fellow

August 2023 – Present

Americorps Member

August 2015 – June 2017

- Totaled over 2000 hours of community service in Chicago Public School facilities