

William C. Dawn

Curriculum Vitae

Education

- May 2022 **Ph.D. Student, Nuclear Engineering**, *North Carolina State University*, Raleigh, NC.
Research related to fast reactor physics simulations and design calculations.
Interested in scalable Finite Element Methods and Exascale computing.
- May 2019 **Master of Science, Nuclear Engineering**, *North Carolina State University*, Raleigh, NC.
Nuclear Engineering University Program (NEUP) Fellow.
Developed simulation suite to model Sodium-cooled Fast Reactors (SFRs).
Dawn, William C. “Simulation of Fast Reactors with the Finite Element Method and Multiphysics Models.” MA thesis. North Carolina State University, 2019.
- May 2017 **Bachelor of Science, Nuclear Engineering**, *North Carolina State University*, Raleigh, NC.
Graduated as Valedictorian and Summa Cum Laude.
Led senior design team. Responsible for project management and interfacing with corporate sponsor.
Senior Design Project: “A Thermal Test Location in a Sodium Cooled Fast Reactor”

Publications

- Dawn, William C. and Scott Palmtag. “A Multiphysics Simulation Suite for Liquid Metal-Cooled Fast Reactors.” In: vol. 159. Sept. 2021. doi: 10.1016/j.anucene.2021.108213.
- Dawn, William C. and Scott Palmtag. “A Multiphysics Simulation Suite for Sodium Cooled Fast Reactors.” In: *Proceedings of PHYSOR 2020* (Mar. 27–Apr. 6, 2020). Cambridge, UK. doi: 10.1051/epjconf/202124706019.
- Dawn, William C., Javier Ortensi, Mark D. Dehart, and Scott P. Palmtag. *Comparison of Higher-Order Neutron Scattering Cross Sections*. Tech. rep. INL/EXT-19-54899. Idaho National Laboratory, 2019. doi: 10.2172/1593864.
- Dawn, William C. *An Analytic Benchmark for the Solution to the Isotopic Fission Spectrum Mixture Problem*. Tech. rep. INL/EXT-19-54998. Idaho National Laboratory, 2019. doi: 10.2172/1593873.
- Loewen, Eric, Sarah DeSilva, and Russell Stachowski. “PRISM Reference Fuel Design.” In: *Nuclear Engineering and Design* 340 (2018). Acknowledged Contributor, pp. 40–53. doi: 10.1016/j.nucengdes.2018.09.016.

Patents

- Loewen, Eric P., James P. Sineath, Dean D. Molinaro, William C. Dawn, Robin D. Sprague, Theron D. Marshall, and Joel P. Melito. “Intermixing Feedwater Sparger Nozzles and Methods for Using the Same in Nuclear Reactors.” 20180277265 (Wilmington, NC). Sept. 2018.
- Loewen, Eric P., James P. Sineath, Dean D. Molinaro, William C. Dawn, William J. Garcia, Oscar L. Meek, and Patrick K. Day. “Acoustic Flowmeter and Methods of Using Same.” 20180277267 (Wilmington, NC). Sept. 2018.

Conference Presentations

Dawn, William C. and Scott P. Palmtag. “Increasing Computational Efficiency of Fluid Property Calculations in CTF.” In: Proceedings of 2017 American Nuclear Society Student Conference (Apr. 6–9, 2017). Pittsburgh, PA.

Dawn, William C., Rebeka S. Gottfried, Matthew T. Ingram, Zachary D. Morey, and Charles W. Tait. “A Thermal Test Location in a Sodium Cooled Fast Reactor.” In: Proceedings of 2017 American Nuclear Society Student Conference (Apr. 6–9, 2017). Pittsburgh, PA.

Poster Presentations

Dawn, William C. “MC2 for High Energy Neutron Cross Sections in MPACT for Molten Salt Fueled Reactors.” In: ORNL Intern Poster Session. Oak Ridge, TN.

Dawn, William C. and Scott P. Palmtag. “Increasing Computational Efficiency of Fluid Property Calculations in CTF.” In: Office of Undergraduate Research Symposium (Apr. 12, 2017). Raleigh, NC.

Dawn, William C., Rebeka S. Gottfried, Matthew T. Ingram, Zachary D. Morey, and Charles W. Tait. “A Thermal Test Location in a Sodium Cooled Fast Reactor.” In: Office of Undergraduate Research Symposium (Apr. 12, 2017). Awarded Sigma Xi Best Undergraduate Engineering Poster. Raleigh, NC.

- Awarded Sigma Xi Best Undergraduate Engineering Poster for “A Thermal Test Location in a Sodium Cooled Fast Reactor”.

Professional Experience

May 2019 - **NEUP Intern**, *Idaho National Laboratory*, Idaho Falls, ID.

- August 2019
- Added fast neutron cross section library capabilities to Rattlesnake neutron transport code.
 - Used Rattlesnake to investigate effects of higher-order neutron scattering in fast reactor systems.
 - Implemented isotopic fission spectrum mixture into Rattlesnake.
 - Authored two technical reports related to work: “Comparison of Higher-Order Neutron Scattering Cross Sections” (INL/EXT-19-54899) and “An Analytic Benchmark for the Solution to the Isotopic Fission Spectrum Mixture Problem” (INL/EXT-19-54998).

May 2018 - **CASL Graduate Assistant**, *Consortium for Advanced Simulation of LWRs (CASL)*, Raleigh, NC.

- August 2019
- Developed lesson and lectured on CTF–MPACT coupling and use for practical reactor designs.
 - Provided technical experience and IT support for student reactor design simulations.
 - Contributed to logistical planning for CASL Institute.

May 2017 - **NESLS Engineering Intern**, *Oak Ridge National Laboratory*, Oak Ridge, TN.

- August 2017
- Added fast neutron cross section library capabilities to MPACT neutron transport code via ISOTXS file reader.
 - Simulated fast neutron chloride molten salt reactor in steady-state and depletion simulations.
 - Developed molten salt reactor models in MPACT, MCNP, and Serpent.
 - Proficient in large project coding and source control with `git`.

August 2015 - **CASL Undergraduate Research Scholar**, *Consortium for Advanced Simulation of LWRs (CASL)*, Raleigh, NC.

- May 2017
- Reduced computing time by 30% by improving steam tables in CTF.
 - Performed code comparisons to verify simulation results in MCNP and MPACT.

- May 2016 - **Edison Engineering Intern**, *GE Hitachi Nuclear Energy LLC*, Wilmington, NC.
- August 2016 ○ PRISM
- Drafted and submitted journal article “PRISM Reference Fuel Design.”
 - Disclosed two patents relating to ESBWR and one patent related to PRISM.
 - Developed PRISM General Description Book and prepared public-facing documents describing PRISM for a general audience.
- May 2015 - ○ LOCA & Containment
- August 2015
- Analyzed reactor transients using TRACG to support 10% power uprate.
 - Created automated data visualization and animation packages using MATLAB.
- August 2014 - **Licensed Reactor Operator**, *NCSU PULSTAR Research Nuclear Reactor*, Raleigh, NC.
- May 2017 ○ Licensed by NRC to operate all controls at NCSU reactor facility.
- Experienced in startup, operation, and troubleshooting on 1 MW research reactor.

Technical Skills

Programming Languages	Fortran, C++, C, Python, MATLAB, L ^A T _E X.	Simulation Packages: DIF3D, MC ² -3, REBUS, MCNP, Serpent, MPACT, CTF.
General Proficiencies	Bash scripting, Github & GitLab Project Management.	

Professional Development and Achievements

- 2021 Alan F. Henry/Paul A. Greebler – American Nuclear Scholarship.
- 2019 College of Engineering Master’s Scholar of the Year.
- 2017-2020 Nuclear Engineering University Program (NEUP) Fellowship.
- Full funding for three years of graduate school.
 - Nationally recognized Department of Energy (DOE) fellowship.
- 2014-2017 Nuclear Engineering University Program (NEUP) Undergraduate Scholarship.
- 2017 College of Engineering Outstanding Senior Award for Scholarly Achievement Nominee.
- 2017 Awarded Sigma Xi Best Undergraduate Engineering Poster for “A Thermal Test Location in a Sodium Cooled Fast Reactor”.
- 2014-2018 American Nuclear Society Scholarship.
- 2012 Eagle Scout.