

Casey Icenhour

Contact Information

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GitHub: <https://github.com/cticenko>

Research Interests

Computational Electromagnetics, Industrial Applications of Plasma Physics, Radio-Frequency Plasma, Advanced Manufacturing, High-Performance Computing, Fusion Energy, Science & Technology Policy, Machine Learning, Artificial Intelligence

Research and Professional Experience

Idaho National Laboratory (INL), Idaho Falls, ID

Graduate Fellow, Nuclear Science & Technology, Computational Frameworks

Jan 2018 - present

- Member of Multiphysics Object-Oriented Simulation Environment (MOOSE) finite element framework development team. Responsibilities include
 - framework code maintenance and improvements;
 - new model development for multiscale, multiphysics, massively-parallel applications;
 - creation of regression and unit tests;
 - support of internal and external users;
 - presentation of external seminars and MOOSE workshops; and
 - review and approval of externally-submitted framework code improvements using GitHub and the MOOSE continuous integration (CI) system.
- Lead Developer of fundamental electromagnetic simulation library for MOOSE (ELK - Electromagnetics Library for Kinetics & fluids). Responsibilities include
 - development and code implementation of physical models;
 - selection and creation of benchmarks and validation studies;
 - support for ELK code usage and coupling.
- Awarded INL Laboratory Directed Research & Development funding (in Advanced Design & Manufacturing) as a Co-Investigator:
S Pitts (PI), D Gaston, N Jerred, C Icenhour, L Aagesen, D Schwen, "Coupling of Spark Plasma Sintering with Advanced Modeling to Enable Process Scale-Up", FY2019 - FY2021

Oak Ridge National Laboratory (ORNL), Oak Ridge, TN

Graduate Student Intern, Fusion and Materials for Nuclear Systems Division

Jul 2016 - Dec 2017

- Developed EELS, a MOOSE application for simple radio-frequency electromagnetic simulation in support of ion cyclotron resonance heating (ICRH) fusion energy research

North Carolina State University, Nuclear Engineering Dept., Raleigh, NC

Graduate Research Assistant, 4th State Applications Research Group

Jul 2013 - Jun 2016

- Utilized particle-in-cell codes to study capacitively-coupled RF plasma discharges

Dean's Doctoral Fellow, NCSU College of Engineering

Aug 2012 - Jun 2013

- Modeled proof-of-concept Z-pinch plasma neutron source for concrete structural interrogation using MATLAB

Education

PhD **North Carolina State University (NCSU), Nuclear Engineering**

2012 - Fall 2020 (expected)

- Concentration in Plasma Physics and Nuclear Fusion
- Dissertation Title: *Development and Validation of Open Source Software for Electromagnetics Simulation and Multiphysics Coupling*
- Advisor: Dr. Steven C. Shannon

- GPA: 4.0
- Honors College
- Concentration in Optics and Communications
- Minors: Mathematics, Physics

Honors and Awards

Idaho National Laboratory Graduate Fellowship	2018 - 2020
DOE Office of Science Graduate Student Research Program, Oak Ridge National Laboratory	2016 - 2017
NCSU College of Engineering Dean's Doctoral Fellowship	2012 - 2013
T. Ray and Frances Louise Gibbs Endowed Scholarship, WCU	2008 - 2012
Most Outstanding Upperclassman, WCU Electrical Engineering	2011

Professional Society Affiliations and Memberships

American Physical Society (APS)
 Institute for Electrical and Electronics Engineers (IEEE)
 Society for Industrial and Applied Mathematics (SIAM)

Scientific Computing Skills

Languages	C++, bash, Python
Operating Systems	Windows, MacOS, Linux (Ubuntu, Fedora)
Mathematical Computing Environments	MATLAB
Multiphysics Code Frameworks	MOOSE Framework
Plasma Physics Codes	VSim 6, XPDP1
Version Control	git
Data Visualization	Paraview, Matplotlib
Mesh Generation Tools	Gmsh
Other Tools	L ^A T _E X

Invited Workshops

- (1) **C. Icenhour**, S. Keniley, C. DeChant, C. Permann, A. Lindsay, R. Martineau, D. Curreli, S. Shannon, "Multi-Physics Object Oriented Simulation Environment (MOOSE)", Invited workshop, APS Gaseous Electronics Conference 2018, <http://meetings.aps.org/link/BAPS.2018.GEC.AS2.1>

Presentations and Conference Proceedings

- (1) **C. Icenhour**, C. DeChant, A. Lindsay, R. Martineau, D. Green, S. Shannon, "Validation Studies using ELK and the Open Source MOOSE Framework Application Zapdos for Electromagnetic Coupled Plasma Simulation", APS Gaseous Electronics Conference 2019, <http://meetings.aps.org/Meeting/GEC19/Session/RR1.6>
- (2) **C. Icenhour**, A. Lindsay, R. Martineau, S. Shannon, "Electromagnetics Simulations with Vector-Valued Finite Elements in MOOSE", 2019 SIAM Conference on Computational Science and Engineering, http://meetings.siam.org/sess/dsp_talk.cfm?p=96892
- (3) **C. Icenhour**, A. Lindsay, D. Green, R. Martineau, S. Shannon, "Elk: A New MOOSE Framework Application for Radio-Frequency Electromagnetics", APS Gaseous Electronics Conference 2018, <http://meetings.aps.org/link/BAPS.2018.GEC.ET1.2>
- (4) S. Shannon, A. Lindsay, D. Graves, **C. Icenhour**, D. Peterson, S. White, "Plasma Simulation in the Multiphysics Object Oriented Simulation Environment MOOSE", APS Gaseous Electronics Conference 2016, <http://meetings.aps.org/link/BAPS.2016.GEC.QR2.2>
- (5) **C. Icenhour**, A. Exum, E. Martin, D. Green, D. Smithe, S. Shannon, "PIC Simulation of RF Plasma Sheath Formation and Initial Validation of Optical Diagnostics using HPC Resources", Poster, APS Division of Plasma Physics Meeting 2014, <http://meetings.aps.org/link/BAPS.2014.DPP.NP8.88>
- (6) **C. Icenhour**, T. Kummerer, D. Green, D. Smithe, S. Shannon, "Validation of RF CCP Discharge Model Against Experimental Data using PIC Method", Poster, APS Gaseous Electronics Conference 2014, <http://meetings.aps.org/link/BAPS.2014.GEC.GT1.67>