Casey Icenhour

Contact Information

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Research Interests

Computational Electromagnetics, Industrial Applications of Plasma Physics, Radio-Frequency Plasma Sheaths, Fusion Energy, High-Performance Computing, Nuclear Security, Nuclear Policy

Research and Professional Experience

Idaho National Laboratory (INL), Idaho Falls, ID
INL Graduate Fellow, Nuclear Science & Technology, Modeling and Simulation **Jan 2018 - present**

- Developing an INL-sponsored MOOSE Framework App (see `https://mooseframework.org`), ELK, for general electromagnetic simulation in direct collaboration with the INL MOOSE Development Team
- Awarded INL Laboratory Directed Research & Development funding (in Advanced Design & Manufacturing) as a Co-Investigator:
  D Gaston (PI), N Jerred, C Icenhour, L Aagesen, D Schwen, S Pitts, "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 Framework App for basic vacuum radio-frequency electromagnetic simulation (see `https://github.com/cticenhour/EELS`) and Matlab codes for self-education in finite-element methods (see `https://github.com/cticenhour/matlab-fem`)

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 interrogation

Education

PhD **North Carolina State University (NCSU)**, Nuclear Engineering **2012 - Aug 2020 (expected)**

- Concentration in Plasma Physics and Nuclear Fusion
- Research Topic Area: Simulation of electromagnetic field structure and wave propagation in inhomogeneous media
- Advisor: Dr. Steven C. Shannon

BS **Western Carolina University (WCU)**, Electrical Engineering **2008 - 2012**

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

Honors and Awards

Idaho National Laboratory Graduate Fellowship	**2018 - 2019**
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, Mathematica, Mathcad
Multiphysics Code Frameworks	MOOSE Framework
Plasma Physics Codes	VSim, XPDP1
Version Control	git
Data Visualization	Paraview, Matplotlib
Mesh Generation Tools	Gmsh
Other Tools	LaTeX

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`