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Riley Cumberland

Education

MS in Nuclear Engineering 2013—*GPA: 3.9/4.3*
1D and 3D Simulation of Electrochemical Behavior of U/UCl3 and Pu/PuCl3 in Molten Salt Systems
Korean Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

BS in Nuclear Engineering 2010—*GPA: 4.0/4.0*
North Carolina State University, Raleigh, North Carolina
Fundamentals of Engineering Exam: Pass

Skills & Knowledge Areas

- Programming – MATLAB, FORTRAN, Python, Linux scripts, VBA, SQL
- Software – SCALE, ANSYS CFX, RELAP/MARS
- Thermal hydraulics – fluid flow, boiling heat transfer, single channel analysis, molten salt
- Electronics – microcontrollers, data acquisition systems
- Electrochemistry – simulation, cyclic voltammetry, electrochemical impedance spectroscopy

Experiences

Postmasters Researcher—Oak Ridge Associated Universities at Oak Ridge National Laboratory *Fall 2014-Present*

- Co-authored numerous technical reports evaluating potential strategies for storage and transportation of spent nuclear fuel
- Automated production of graphs using Python and VBA, accelerating out team's analysis cycle
- Post processing specialist for the systems analysis team

Researcher—University of Utah *Spring 2014-Fall 2014, part-time*

- Provided technical support, and software updates to investigators for the electrorefiner modeling software developed at KAIST.

Graduate Research Assistant— Korean Advanced Institute of Science and Technology *Fall 2011-Fall 2013*

- Developed and tested models of electrochemical systems using Fortran and ANSYS CFX
- The CFX model included turbulent flow, mass transport, and electrochemical reaction kinetics.
- Reproduced experimental results with the Fortran electrorefiner code, coupled with a MATLAB multi-parameter optimization algorithm to obtain physical parameters
- Assembled a molten salt experimental facility. Included a furnace operating at 500°C in an argon glovebox, data acquisition system, and galvanostat.

Research Assistant—NC State University & Idaho Center for Advanced Energy Studies *Fall 2009-Fall 2011*

- Developed electrochemistry models for pyroprocessing.
- Created MATLAB based graphical user interface for University of Idaho
- Tripled execution speed of the University of Idaho model

Intern—Idaho National Laboratory *Summer 2007 & Summer 2008*

- Improved RELAP execution times with minimal increases in measures of error

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Publications & Conference Papers

- J. J. Jarrell, R. A. Joseph III, Riley M. Cumberland, G. M. Petersen, J. Fortner, E. Kalinina, T. Severynse, "An Evaluation of Standardized Canisters in the Waste Management System," Proc. WM2016, Phoenix, AZ, March 6-10, 2016
- Mario Gonzalez, Lauryn Hansen, Devin Rappleye, Riley Cumberland, Michael Simpson, "Application of a One-dimensional Transient Electorefiner Model to Predict Partitioning of Plutonium from Curium in a Pyrochemical Spent Fuel Treatment Process," Nuclear Technology **192** (2015)
- Riley Cumberland, Josh Jarrell, Rob Howard, Jeff Williams, "A Review of Multipurpose Canister Concepts for Standardization in the Waste Management System," Waste Management Conference, Phoenix, AZ (2015)
- Riley Cumberland, Man-Sung Yim, "A Computational Meta-analysis of UCl_3 Cyclic Voltammograms in LiCl-KCl Electrolyte," *Journal of the Electrochemical Society* **161**:4 (2014)
- Riley Cumberland, Man-Sung Yim, "Development of a 1D Transient Electrorefiner Model for Pyroprocess Simulation," *Annals of Nuclear Energy* **71** (2014)
- Riley Cumberland et al. "Analysis of Equilibrium Methods for the Computational Model of the Mark-IV Electrorefiner," *Nuclear Engineering Technology*, **11**:6 (2011)
- Riley Cumberland, George Mesina, "Improvements to the Time Stepping Algorithm of RELAP5-3D," *DOE Journal of Undergraduate Research*, **9** (2009)