Madicken Munk

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3115B Etcheverry Hall, University of California, Berkeley

Education

University of California, Berkeley Berkeley, California
PhD Graduate Student, Nuclear Engineering
Attended August 2011 – Present
Master of Science, Nuclear Engineering
Completed December 2013

Oregon State University Corvallis, Oregon
Bachelor of Science, Nuclear Engineering
Attended September 2007 – June 2011

Skills and Experience

Codes and Code Packages

SERPENT	MCNP5, MCNP6
Python	MATLAB
COMSOL Multiphysics	Computer Aided Design Using SolidWorks

Topical Experience

Reactor Physics	Neutron Transport
Software Development	Reactor Core Design
Flibe-based reactor systems	Pebble Bed Reactors
Advanced Reactor Concepts	Isotope Geochemistry

Employment

University of California, Berkeley Nuclear Engineering Department August 2011 to Present

- Development of a hybrid deterministic (Denovo S_N) / monte-carlo transport method to reduce variance reduction in shielding problems with strong angular anisotropy. This work has been performed in collaboration with developers at Oak Ridge National Laboratory.
- Design of a neutron source for in-situ irradiation of geological samples for $^{40}Ar/^{39}Ar$ geochronology of martian samples. This is in collaboration with the Scottish Universities Environmental Research Centre (SUERC).
- MS work involved evaluating the lifetime of a central reflector in a FHR core based on the evaluation of radiation-induced stresses. This involved connecting literature data, MCNP data, and COMSOL modules to determine the lifetime of the reflector.
- Designed a fluoride salt-cooled high temperature test reactor (FHTR) in parallel with the development of a commercial FHR design. This included optimization of core and fuel design while maintaining similitude between the FHTR and FHR, insurance of negative temperature feedback mechanisms, and achievable burnup of the fuel.
- As a Graduate Student Instructor, work included grading assignments, holding review sessions, and a weekly hour-long discussion section to review course material. GSI assignment covered Nuclear Reactions and Radiation, Introduction to Nuclear Reactor Theory, and Numerical Methods in Nuclear Engineering.

Oregon State University Radiation Center June 2008 to August 2011

- From 2008 to 2011, design and simulation of Molybdenum-99 production target in the Oregon State TRIGA reactor were performed using MCNP5. Verification of reactivity worth and power distribution of the various design modifications also included in project.
- 2010-2011 analyses included MCNP5 verification of Reed College reactor for their updated Safety Analysis Report and license renewal. Included comprehensive review of reactor physics and neutronic calculations pertinent to safety analysis.

- In a joint study between *Lawrence Livermore National Laboratories* and Oregon State University during Summer 2008, group research projects focused on interpersonal skills and dynamics involving teams of engineers and scientists.

Scholarships and Awards

- ANS Best Graduate Paper Award, Student Conference — Spring 2014
- Outstanding Graduate Student Instructor Award — 2013-2014
- UC Regents Fellowship, UC Berkeley — 2014
- NRC Fellowship, UC Berkeley — 2011-2012
- DOE NEUP Scholarship Awardee — 2009-2011
- Awarded NRC Scholarship by OSU department of NE/RHP — Fall 2009
- Awarded National Academy for Nuclear Training Scholarship — Summer 2009

Publications, Presentations and Patents

- "Design and Feasibility Study of a Compact Neutron Source for Extra-terrestrial Geochronology Applications," Munk, M., Morgan, L., Davidheiser-Kroll, B., et al., Joint International Conference on Mathematics and Computation (M&C), Nashville, TN, April 2015
- "Instrumentation Development for planetary in-situ $^{40}Ar/^{39}Ar$ Geochronology", Munk, M., Morgan, L., Davidheiser-Kroll, B., et al., poster presentation, American Nuclear Society Winter Meeting, November 2014
- "Instrumentation Development for planetary in-situ $^{40}Ar/^{39}Ar$ Geochronology", Morgan, L., Davidheiser-Kroll, B., Munk M., et al., poster presentation, Goldschmidt Conference June 2014
- "Use of Comsol Multiphysics for the Evaluation Of Radiation-Induced Stresses in the PB-FHR", Munk, M.. paper presentation, ANS student conference, April 2014
- A. Cisneros et al., "Fluoride-Salt-Cooled, High-Temperature Reactor (FHR) Methods and Experiments Program White Paper." UCBTH-12-002, Department of Nuclear Engineering, UC Berkeley (2013).
- G. Cao et al., "Fluoride-Salt-Cooled, High-Temperature Reactor (FHR) Matierals, Fuels and Components White Paper." UCBTH-12-003, Department of Nuclear Engineering, UC Berkeley (2013).
- D. Carpenter et al., "Fluoride-Salt-Cooled, High-Temperature Reactor (FHR) Development Roadmap and Test Reactor Performance Requirements White Paper." UCBTH-12-004, Department of Nuclear Engineering, UC Berkeley (2013).
- "Preliminary Design of a FHR Test Reactor Core", Munk, M., Cisneros, A. T., Greenspan, E., Peterson, P.F.. paper presentation, ANS national conference, June 2012.
- "Molybdenum Production in a Low-Power Reactor", Palmer, T.S., Reese, S., Keller, S.T., Munk, M., application submitted July 2010, **Patent Pending**
- *Optimization of Molybdenum-99 Production in Oregon State TRIGA Reactor*, Madicken Munk, conference presentation, ANS national student conference 2010.
- *Production of Medical Isotope in Oregon State University TRIGA Reactor*, Madicken Munk, poster presentation. 1st International Nuclear Energy Conference, Warsaw, Poland, April 2011.

Activities

- Vice President of University of California, Berkeley Chapter of Alpha Nu Sigma, 2013-Present
- Attended Frédéric Joliot and Otto Hahn Summer School, August 2012, on Small Modular Reactors
- President of Oregon State University student American Nuclear Society chapter, 2011-2012
- Secretary of Oregon State University student American Nuclear Society chapter, 2009-2011
- Member of Alpha Nu Sigma, Nuclear Engineering Honors Society, inducted May 2011
- President of Mentors and Mentees, an undergraduate peer-mentoring program.
- College of Engineering Ambassador
- Participated in numerous departmental and university-sponsored outreach events