

Dr. Matthew J Memmott

350 U Clyde Building, Provo, UT 84602 * (801) 422-6237 * email: memmott@byu.edu

Experience

Assistant Professor, Chemical Engineering Department (August 2014 to present)

Brigham Young University – Provo, UT

- Establishing Nuclear expertise and programs at BYU
- Mentoring Graduate and Undergraduate Students
- Creating Nuclear Courses for Engineering Students
- Voting Member of the RARCC
- Perform Safety Analyses for Integral, Inherently Safe Light Water Reactor (I²S-LWR)

Senior Engineer, Advanced Plant Technology (May 2013 to July 2014)

Westinghouse Electric Company – Cranberry Township, Pennsylvania

- Designed and evaluated alternative piping system to reduce AP1000 head vent hydrodynamic loads to acceptable levels
- Track Organizer for ICONE 22
- Designed “(I²S-LWR)” safety systems for the winning Department of Energy (DOE) Nuclear Engineering University Partnership (NEUP) FY2012 Integrated Reactor Project (IRP) proposal
- Created and evaluated power generating systems for I²S LWR
- Mentored interns in selecting, evaluating, and writing a final report on innovative LWR research topics

Senior Engineer, Advanced Reactors (July 2009 to May 2013)

Westinghouse Electric Company – Cranberry Township, Pennsylvania

- Managed multi-disciplinary team in developing the Westinghouse small modular reactor (SMR) reactor coolant pump
- Session Chair for multiple ANS sessions
- Led technical development and design for the Westinghouse SMR
- Co-designed Westinghouse SMR safety systems
- Presented Westinghouse SMR to utility executives
- Presented the Westinghouse SMR design in student seminars
- Led Westinghouse participation in DOE NEUP FY2011 IRP
- Created simple methodology for evaluating hydrodynamic loads (HDL) in key AP1000 systems
- Evaluated HDL in AP1000 critical path valves and pipes
- Developed innovative design changes for AP1000 head vent piping to prevent HDL induced nozzle failures
- Co-developed patent for optimal fast reactor (FR) safety configuration
- Co-developed two pending patents for Westinghouse SMR safety systems design
- Negotiated cost-free acquisition of ANL FR code suite and in-house training for Westinghouse scientists

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- Managed FR development efforts for Westinghouse R&T
- Performed technology-based FR parametric analyses to determine optimal coolant and reactor configuration

Research Assistant (September 2005 to May 2009)

Massachusetts Institute of Technology – Cambridge, Massachusetts

- Created full plant RELAP5-3D model based on the Argonne National Laboratory's sodium fast reactor (SFR), the ABR1000, to determine safety of innovative fuel designs
- Designed annular fuel rod design for the SFR which allowed for up to ~30% uprates of reactor power while maintaining thermal-hydraulic safety margins
- Designed bottle-shaped fuel design for the SFR which decreased core pressure drop by up to ~33% while maintaining neutronic performance
- Developed SFR subchannel analysis model using RELAP5-3D that can simulate steady-state or transient analyses for any fuel/assembly design and verified model against ORNL 19-pin test
- Modeled high temperature steam electrolysis (HTSE) plant
- Optimized operation of HTSE plant using ASPEN
- Developed integration plan for HTSE plant and nuclear reactor which enhances safety and maximizes hydrogen production

Teaching Assistant (June 2006)

INPO Reactor Training Course – Cambridge, Massachusetts

- Taught 14 utility executives nuclear engineering principles
- Assisted in preparing and maintaining teaching materials
- Created computer program to organize feedback from participants

Nuclear Engineering Intern (May 2005 - July 2005)

Idaho National Laboratory – Idaho Falls, Idaho

- Refined model for cool down of ceramic waist form (CWF) furnace using mathCAD
- Modeled canister design for CWF process in furnace using FiDAP
- Verified CWF model assumptions using FiDAP

Research Assistant (April 2003 – April 2005)

Brigham Young University - Provo, Utah

- Refined fabrication process for micro-batteries
- Worked in team developing nano wire fabrication methods
- Improved blood thrombosis model for use in CFD computations
- Modeled and meshed catheter shapes using modeling software

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Assistant Process Control Engineer (June - August 1999 & 2002)
Flying J Refinery - North Salt Lake, Utah

- Constructed official company databases to tabulate equipment
- Refined process control programs for various refinery units

Civil Engineering Intern (February - May 1999)
Thomas Engineering - Bountiful, Utah

- Calculated strengths needed for stable silo foundations
- Helped draft changes to SLC Airport for 2002 Winter Olympics

Violinist (June 2005 - August 2005)
Strings – Centerville, UT

- 2nd Violinist in a quartet playing for wedding receptions
- Organized music repertoire
- Assisted in performance scheduling

Education

PhD, Nuclear Science and Engineering, June 2009

M.S., Nuclear Science & Engineering, February 2007

GPA 4.7/5.0 Massachusetts Institute of Technology, Cambridge, MA

B.S., Chemical Engineering, April 2005

GPA 3.79/4.0 Brigham Young University, Provo, Utah

Awards and Scholarships

- DOE Advanced Reactor Concept Award, October, 2013 - \$600k
- DOE NEUP FY2012 IRP Award, FY 2012 - \$7.5M (\$600k to Westinghouse)
- NRC Nuclear Education Fellowship, 2008-2009
- DOE Nuclear Engineering/Health Physics Fellowship 2005-2009
- Heritage Scholarship (four year, full-tuition), BYU, 1999-2005

Volunteer

Ward Mission Leader (February 2013 – Present)

The Church of Jesus Christ of Latter-day Saints – Pittsburgh, PA

- Managed 4 full time and 9 part time missionaries
- Managed full time missionary efforts in congregation boundaries
- Prepared and delivered sermons regarding missionary work
- Coordinated integration of missionaries/congregation proselytizing
- Taught people about gospel in their homes with the missionaries

Executive Secretary for Bishopric (December 2009 – June 2012)

The Church of Jesus Christ of Latter-day Saints – Pittsburgh, PA

- Scheduled appointments with congregation leadership
- Assisted in organizing and managing congregation operations

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Congregation Organist (September 2009 – April 2013)

The Church of Jesus Christ of Latter-day Saints – Pittsburgh, PA

- Played organ as vocal accompaniment during church meetings

Leader in Youth Organizations (September 2005 – May 2009)

The Church of Jesus Christ of Latter-day Saints – Cambridge, MA

- Taught religious principles to inner-city youth
- Organized activities, service projects, study sessions, and social interactions for 13 teenage youth
- Worked with others to teach life skills to inner-city teenagers
- Planned activities, games, and group gatherings for teenage youth

Volunteer Representative (February 2000 - March 2002)

The Church of Jesus Christ of Latter-day Saints - Minnesota

- Taught religious principles to families and individuals
- Supervised 12 representatives and trained 3 new representatives

Eagle Scout, Boy Scouts of America

Skills

- ASPEN
- Visual Basic
- VIPRE
- MCNPX
- MathCAD
- StarCCM
- RETRAN
- RELAP5 (mod 3.3 and 3D)

Interests

Piano, Violin, Skiing, Reading, Games, Weight Lifting, Outdoor Activities

Publications

M. J Memmott, A. Manera, "The Use of a flashing Drum to Generate Steam in the Integral, Inherently Safe Light Water Reactor", *Nuclear Technology*, **pending**.

Walsh, E., Manera, A., Memmott, M. J, Ferroni, P., Wang, M. J., Lee, J. C., "Preliminary Safety Considerations for the Integral Inherently Safe Light Water Reactor (I2S-LWR), American Nuclear Society Winter Meeting, Anaheim, CA, November 9-13, 2014.

Manera, A., Memmott, M.J., 2014. Design and trade-off of the Passive Decay Heat Removal System (DHRS) of the Integral, Inherently Safe Light Water Reactor (I2S-LWR). Prof. of 10th International Conf. on the Nuclear Option in Countries with Small and Medium Electricity Grids, Zadar, Croatia, June 1 - 4.

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M. J Memmott, A. Manera, "The use of a flashing Drum to Generate Steam in the Integral, Inherently Safe Light Water Reactor", Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP), 2014, Charlotte, NC, USA, April 2014.

B. Petrovic, M. Marcese, M. J Memmott, "Integral Inherently Safe LWR (I²S-LWR) Concept; Integral Vessel Layout", Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP), 2014, Charlotte, NC, USA, April 2014.

C. Fiorina, F. Franceschini, M. J Memmott, "Safety Aspects of Thorium Fuel in Sodium-Cooled Fast Reactors", Fast Reactor Conference 2013 (FR13), Paris, France, March 2013.

B. Lu, M. J Memmott, A. W. Harkness, "Small Modular Reactor (SMR) Instrumentation & Control (I&C) Functional and Structural Requirements & Considerations", Proceedings of the 8th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human Machine Interface Technologies (NPIC & HMIT 2012), San Diego, CA, USA, November 2012.

M. J Memmott, A. W. Harkness, J. Van Wyk, "Westinghouse Small Modular Reactor Nuclear Steam Supply System Design", Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP), 2012, Chicago, IL, USA, July 2012.

M. J Memmott, C. Stansbury, C Taylor, "Westinghouse Small Modular Reactor Balance of Plant and Supporting Systems Design", Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP), 2012, Chicago, IL, USA, July 2012.

J. Cronje, J. Van Wyk, M. J Memmott "Overview of the Westinghouse Small Modular Reactor Building Layout", Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP), 2012, Chicago, IL, USA, July 2012.

M. Memmott, J. Buongiorno, P. Hejzlar, "An Evaluation of the Annular Fuel and Bottle-shaped Fuel Concepts for Sodium Fast Reactors", *Nuclear Technology*, Vol. 173, 2011.

M. Memmott, J. Buongiorno, P. Hejzlar, "On the Use of RELAP5-3D as a subchannel analysis code", *Nuclear Engineering Design*, 240, 807–815, 2010.

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M. J Memmott, J. Buongiorno, P. Hejzlar, "On the Use of RELAP5-3D for Subchannel Analysis of Sodium-Cooled Reactor Fuel Assemblies", N13P 1224, *13th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-13)*, Kanazawa City, Ishikawa Prefecture, Japan, September 27-October 2, 2009.

M. J Memmott, P. Hejzlar, J. Buongiorno, "Thermal-Hydraulic Analysis of Innovative Fuel Configurations for the Sodium Fast Reactor" MIT-ANP-TR-123, August, 2009.

M. Memmott, J. Buongiorno, P. Hejzlar, "Subchannel Analysis of Sodium-Cooled Reactor Fuel Assemblies with Annular Fuel Pins", Paper 9033, *Proceedings of ICAPP '09*, Tokyo, Japan, May 10-14, 2009.

M. J Memmott, J. Buongiorno, P. Hejzlar, "Development and Validation of a Flexible RELAP5-3D Based Subchannel Analysis Model for Fast Reactor Fuel Assemblies" MIT-ANP-TR-121, December, 2008.

M. J Memmott, J. Buongiorno, P. Hejzlar, "Innovative Fuel Configurations to Improve the Economics of the GNEP Sodium-Cooled Fast Reactor" Progress Report to Idaho National Lab, Battelle Energy Alliance, LLC (BEA), Release No. 00024 under Blanket Master Contract No. 00000063, August, 2008.

M. J Memmott, J. Buongiorno, P. Hejzlar, "An assessment of Annular Fuel for Sodium-Cooled Fast Reactors," *Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP)*, 2008, Anaheim, CA, USA, June 2008.

H. Zhang, H. Zhao, C. Davis, M. J Memmott, "RELAP5 Analysis of the Hybrid Loop-Pool Design for Sodium Cooled Fast Reactors," *Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP)*, 2008, Anaheim, CA, USA, June 2008.

M. J Memmott, M.J. Driscoll, M.S. Kazimi, and P. Hejzlar, "Hydrogen Production for Steam Electrolysis Using a Supercritical CO₂-Cooled Fast Reactor", MIT Report MIT-NES-TR-007, February 2007.

M. J Memmott, "Hydrogen Production Using a Supercritical CO₂-Cooled GFR and Steam Electrolysis", Thesis for Master of Science Degree, MIT, February, 2007

M. J Memmott, M.J. Driscoll, P. Hejzlar, "Synergistic Configuration of a GFR for Hydrogen Production by Steam Electrolysis", *Transactions of the*

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American Nuclear Society Vol 95, Albuquerque, New Mexico, November 2006

Patents

pending - U.S. Serial Number 13/495,069, "Combined Core Makeup Tank and Heat Removal System for a Small Modular Pressurized Water Reactor", filed June 13th, 2012.

pending - U.S. Serial Number 13/495,083, "Small Modular Reactor Safety Systems", filed June 13th, 2012.

Patent # EP2472522, "Optimum Configuration for Fast Reactors", Filed 22nd, November 2011.