Robert K. Salko

Oak Ridge National Laboratory
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Education

B.S. Mechanical Engineering
The Pennsylvania State University
December, 2006

B.S. Nuclear Engineering, with Honors
The Pennsylvania State University
December, 2006

M.S. Nuclear Engineering
The Pennsylvania State University
May, 2010

Ph.D. Nuclear Engineering
The Pennsylvania State University
December, 2012

Computer Skills

T/H Codes:
- COBRA-TF
- VIPRE
- RETRAN
- COBRA-IV

Software:
- STAR-CCM+
- Solidworks
- LaTeX
- Unix/Linux

Languages:
- Fortran
- Python
- c++

Employment History

Staff Scientist   Fall 2014–current
Oak Ridge National Laboratory, Oak Ridge, TN
- Thermal hydraulics modeling and simulation
- Development of COBRA-TF subchannel thermal hydraulics code in support of CASL program

Postdoctoral Researcher   Summer 2013–Fall 2014
Oak Ridge National Laboratory, Oak Ridge, TN
- Product owner for the COBRA-TF subchannel code
- Development and maintenance efforts relating to COBRA-TF
- Supported multiphysics coupling activities in the CASL program

Postdoctoral Researcher   Fall 2012–Spring 2013
The Pennsylvania State University, State College, PA
- Facilitated COBRA-TF's adoption into the CASL program by performing critical code optimizations
- Developed post-processing capabilities, allowing for simulation visualization
- Developed pre-processing utility for fast, user-friendly generation of COBRA-TF input files
- Authored the COBRA-TF Theory Manual

Summer Intern   Summer 2010
Oak Ridge national Laboratory, Oak Ridge, TN
- Performed study for coupling COBRA-TF with the Lattice Boltzman Method based code, FlowLaB-3D
- Study included performing a mesh size sensitivity analyses and decoupling the momentum equation solution process from COBRA-TF

Summer Intern   Summer 2007
Indian Point Nuclear Power Plant, Buchanan, NY
- Used RETRAN to model transients in Indian Point Units 2&3
- Made modifications to RETRAN plant models to improve accuracy of the steam dump system and pressurizer control system

Summer Intern   Summer 2006
Idaho National Laboratory, Idaho Falls, ID
- Aided in characterization of physical properties of different graphite types for use in the Very High Temperature Reactor (VHTR)
- Produced graphite billet cut-up diagrams for four different graphite types using Autodesk Inventor

Graduate Research Activities

Coolant Line Analysis Package Development   Fall 2009 – Fall 2012
- Development of multi-phase, 1-D, thermal-hydraulics analysis code capable of modeling coolant-line regions and being coupled to COBRA-TF
- Implemented independent separated and coupled numerical algorithms

CFD Benchmark of NESTOR Test Data   Spring 2011 – Summer 2012
- Participated in international round-robin with the intention of benchmarking current CFD modeling techniques against high-fidelity test data from PWR rod-bundle heat transfer experiments

Onset of Nucleate Boiling (ONB) Criterion Development   Fall 2007 – Summer 2011
- Used VIPRE-I subchannel code for analysis of NESTOR tests
- Development of single-phase heat transfer and grid-spacer cooling enhancement models and ONB wall superheat criterion

Publications

V. Kucukboyaci, Y. Sung, and R. Salko, "COBRA-TF Parallelization and Application to PWR Reactor Core Subchannel DNB Analysis," ANS MC2015–Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method, 2015.

R. Salko, T. Lange, V. Kucukboyaci, Y. Sung, J. Gehin, and M. Avramova. "Development of COBRA-TF for Modeling Full-Core, Reactor Operating Cycles," Advances in Nuclear Fuel Management V (ANFM 2015), Hilton Head Island, South Carolina, USA, March 29–April 1, 2015.

R. Pawlowski, K. Clarno, R. Montgomery, R. Salko, T. Evans, J. Turner, and D. Gaston, "Design of a High Fidelity Core Simulator for Analysis of Pellet Clad Interaction," Proceedings of the ANS Joint International Conference on Mathematics and Computation (M&C 2015), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method, Nashville, TN, USA, 2015.

R.K. Salko, R.C. Schmidt, and M.N. Avramova, "Optimization and Parallelization of the Thermal-Hydraulic Subchannel Code for High-Fidelity Multi-Physics Applica-

tions," Annals of Nuclear Energy (2014), doi:10.1016/j.anucene.2014.11.005.

S. Palmtag, K. Clarno, G. Davidson, R. Salko, T. Evans, J. Turner, and R. Schmidt, "Coupled Neutronics and Thermal-Hydraulic Solution of a Full-Core PWR using VERA-CS," Proceedings of International Topical Meeting on Advances in Reactor Physics (PHYSOR), Kyoto, Japan, 2014.

R.K. Salko, et al, "Improvements, Enhancements, and Optimization of COBRA-TF," International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2013), Sun Valley, Idaho, USA, May 5–9, 2013.

R.K. Salko and M.N. Avramova, "Uncertainty Analysis of Sub-channel Code Calculated ONB Wall Superheat in Rod-Bundle Experiments using the GRS Methodology," Progress in Nuclear Energy, **65**, pp. 42–49, May, 2013.

P. Péturaud, R.K. Salko, A. Bergeron, S. Yagnik, and M.N. Avramova, "Analyses of Single-Phase Heat Transfer and Onset of Nucleate Boiling in a Rod Bundle with Mixing Vane Grids," International Topical Meeting on Nuclear Reactor Thermal Hydraulics, NURETH-14, Toronto, Ontario, Canada, September 25–30, 2011.

R.K. Salko, M.N. Avramova, and A. Ohnuki, "Modification of COBRA-TF for Improved Vessel-Wide Transient Analysis," American Nuclear Society Meeting, Las Vegas, NV, Winter, 2010.

P. Péturaud, R.K Salko, A. Bergeron, and M.N. Avramova, "Analyses of Single-Phase Heat Transfer and Onset of Nucleate Boiling in Rod Bundles," International Conference On Nuclear Engineering 18, Xi'an, China, May 17-21, 2010.

Invited Talks   "CTF Improvements, Developments, and Applications in CASL: Series of Talks for Second Annular CTF User Group Meeting". CTF-2 Meeting, Madrid, Spain. May 21, 2015.

"CTF Improvements, Developments, and Applications in CASL: Series of Talks for First Annual CTF User Group Meeting". CTF-1 Meeting, Garching, Germany. May 14th, 2014.

"Overview of CTF Theory and Testing". NuScale Power, Corvallis, OR. March 31st, 2014.

"Development, Improvement, and Validation of Reactor Thermal-Hydraulic Analysis Tools". Oak Ridge National Laboratory, Oak Ridge, TN. March 1st, 2013.

"Sub-Channel Code Developments for High-Fidelity, Large-Scale LWR Simulations". Nuclear Engineering Seminar. The Pennsylvania State University, University Park, PA. October 25th, 2012.

"NESTOR: CFD Round Robin Phase I Results". Electric Power Research Institute Round Robin on CFD Modeling of the NESTOR Tests. Grenoble, France. March 27st, 2012.

"Proposal for Expansion of CTF Modeling Capabilities to Cold-Leg, Downcomer, and Plenum Regions". Mitsubishi Heavy Industries Workshop. MHI, Kobe, Japan.

January 20$^{\text{th}}$, 2010.

"Analysis of Single-Phase Heat Transfer and Onset of Nucleate Boiling in Rod Bundles". PWR Technical Advisory Committee Meeting. Chicago, IL. August 31$^{\text{st}}$, 2009.

Honors and Awards

- Co-recipient of an ORNL Significant Event Award for contribution to CASL milestone, "Qualify VERA-CS for Multi-Cycle (with Fuel Reloading) PWR Core Simulations Capability", October, 2015
- Chosen as the CASL 2014 Technical Contributor of the Year (CASL "Knight" award)
- Graduated with honors in Nuclear Engineering, December, 2006
- Obtained Engineer in Training certificate, April, 2006
- Received scholarships based on academic achievement from Dominion (fall, 2004), Exelon Nuclear (summer, 2005), and the American Nuclear Society (summer, 2005)