Andrei Rykhlevskii

Contact Information

Graduate Research Assistant
University of Illinois, Urbana-Champaign
Nuclear, Plasma, and Radiological Engineering

mobile: (217) 305-2385
e-mail: andrewryh@gmail.com

Research Interests

Molten Salt Reactors physics, neutron transport, Monte Carlo, multiphysics simulation of advanced reactors, online reprocessing simulation, validation and verification, high performance computing

PhD

University of Illinois at Urbana-Champaign, Nuclear Engineering **Aug 2016 – Present**

- Developing neutronics simulation tool for load-following Molten Salt Reactor (MSR)
- Advisor: Professor Kathryn D. Huff
- Concentration in Computational Science and Engineering

MSc

University of Illinois at Urbana-Champaign, Nuclear Engineering **Aug 2016 – May 2018**

- Advanced online fuel reprocessing simulation for thorium-fueled Molten Salt Breeder Reactor
- Advisor: Professor Kathryn D. Huff

MSc

Financial University - Moscow, Russia, Financial Management **Oct 2011 – Mar 2014**

- Using stock market tools for IT-industry investments
- Advisor: Professor Svetlana Grishkina

BSc

Bauman Moscow State Technical University,Nuclear Engineering **Sep 2004 – Jun 2010**

- Calculating structural materials activation for VVER-1200 decommissioning
- Concentration in Computational Reactor Physics and Nuclear Fuel Cycle

Research Experience

University of Illinois at Urbana-Champaign, Urbana, IL
Graduate Research Assistant, Advanced Reactors and Fuel Cycles Group **Aug 2016 – Present**

- Developing computational tools and models for advanced reactor physics
- Investigating load-following capabilities for MSRs
- Modeling MSR's neutronics using Monte Carlo code Serpent
- Creating MSR models in multiphysics environment MOOSE
- Generating problem-oriented nuclear data libraries using Serpent, SCALE, OpenMC

Oak Ridge Natinal Laboratory, Oak Ridge, TN
NESLS Intern – Reactor Physics Group **May 2018 – Aug 2018**

- Developed a various Fast Spectrum Molten Salt Reactor neutronics models (SCALE, Serpent)
- Implemented and tested continuous online separation and feeds for MSR
- Analyzed MSR fuel cycle performance in comparison with Sodium-cooled Fast Reactors

OKB GIDROPRESS (State Atomic Energy Corporation "ROSATOM"), Russia
Lead Engineer **Dec 2015 – Jul 2016**
Extending life cycle of Nuclear Power Plants (NPP) with VVER-440

BUKO Ltd, Podolsk, Russia **Sep 2014 – Dec 2015**
Financial analyst
Developed and applied trading robots (C#, VB) for securities exchange

Svyaz Standart Ltd, Podolsk, Russia **Feb 2012 – Aug 2014**
Chief Technology Officer
Designed and managed Internet Service Provider (ISP) metro networks

OKB GIDROPRESS (State Atomic Energy Corporation "ROSATOM"), Russia
Nuclear Engineer **Nov 2009 – Feb 2012**

- Performed neutronics calculations for expending operation period of Balakovo and Kola NPPs
- Analyzed decommissioning for the Preliminary Safety Analysis Report of Belene NPP, Bulgaria
- Performed simulations for V&V and certification of KATRIN-2.0 deterministic S_N code
- Developed a Matlab code for processing neutron flux data collected from NPPs

Honors and Awards

Kuck Computational Science & Engineering Scholarship	**2020**
American Nuclear Society, John and Muriel Landis Scholarship	**2017-2020**
Podolsk city council award for development of innovative entrepreneurship in Podolsk	**2014**
Graduated FU with high distinction (highest graduation honor)	**2014**
Graduate scholarship for excellent students, FU	**2013**
Research achievement award, OKB GIDROPRESS	**2011**
Academic scholarship for distinguished student, BMSTU	**2008–2010**
Student Professional Society scholarship, BMSTU	**2004–2010**

Journal Publications

[1] **Rykhlevskii, A.**, Bae, J.W., Huff, K. "Modeling And Simulation of Online Reprocessing in the Molten Salt Breeder Reactor." **Annals of Nuclear Energy**, `https://doi.org/10.1016/j.anucene.2019.01.030`, Jun. 2019.

[2] Lindsay, A., Ridley, G., **Rykhlevskii, A.**, Huff, K. "Introduction to Moltres: an Application for Simulation of Molten Salt Reactors." **Annals of Nuclear Energy**, vol. 114, Pages 530 - 540, 2018. `doi.org/10.1016/j.anucene.2017.12.025`, Apr. 2018.

Submitted

[3] Ashraf, O., **Rykhlevskii, A.**, Tikhomirov, G.V., Huff, K.D. "Whole core analysis of the Single-fluid Double-zone Thorium Molten Salt Reactor (SD-TMSR)." Submitted to **Annals of Nuclear Energy**, May 2019.

Refereed Conference Proceedings

[4] **Rykhlevskii, A.**, O'Grady, D., Kozlowski, T., Huff, K. "The Impact of Xenon-135 on Load Following Transatomic Power Molten Salt Reactor." Submitted to **Transactions of the American Nuclear Society Winter Conference.** Washington, DC, United States, 2019.

[5] Park, S.M., **Rykhlevskii, A.**, Huff, K. "Safety Analysis of the Molten Salt Fast Reactor Fuel Composition Using Moltres." Submitted to **GLOBAL 2019.** Seattle, WA, United States, September 2019.

[6] Betzler, B.R., **Rykhlevskii, A.**, Worrall, A., Huff, K. "Impacts of Fast Spectrum Molten Salt Reactor Characteristics on Fuel Cycle Performance." Submitted to **GLOBAL 2019.** Seattle, WA, United States, September 2019.

[7] **Rykhlevskii, A.**, Betzler, B.R., Worrall, A., Huff, K. "Fuel Cycle Performance of Fast Spectrum Molten Salt Reactors designs." Submitted to **M&C 2019 - International Conference on Mathematics & Computational Methods Applied to Nuclear Science and Engineering.** Portland, OR, United States, August 2019.

[8] **Rykhlevskii, A.**, Lindsay, A., Huff, K. "Full-Core Analysis of Thorium-Fueled Molten Salt Breeder Reactor using the SERPENT 2 Monte Carlo code." **Transactions of the American Nuclear Society Winter Conference.** Washington, DC, United States, 2017.

[9] **Rykhlevskii, A.**, Lindsay, A., Huff, K. "Online Reprocessing Simulation for Thorium-Fueled Molten Salt Breeder Reactor." **Transactions of the American Nuclear Society Winter Conference.** Washington, DC, United States, 2017.

[10] **Rykhlevskii, A.**, Tsofin, V. "Comparing fast neutron transport calculations using code package KATRIN-2.0 for various options of VVER-440 core setup." **Scientific and technical conference of young specialists.** Podolsk, Russia. March, 2011.

Refereed Conference Abstracts

[11] **Rykhlevskii, A.**, Lindsay, A., Huff, K. "Simulation of Molten Salt Reactors with Moltres." **2019 SIAM Conference on Computational Science and Engineering**, Spokane, WA, February 2019.

[12] **Rykhlevskii, A.**, Betzler, B.R., Bae, J.W., Huff, K. "Fuel Cycle Performance of Fast Spectrum Molten Salt Reactor Designs." (poster) **Oak Ridge National Laboratory Nuclear Engineering Science Laboratory Synthesis Poster Session.** Oak Ridge, TN, United States, 2018.

[13] **Rykhlevskii, A.**, Huff, K. "Computational Tools for Advanced Molten Salt Reactor Simulation." **Blue Waters Symposium**, Sun River, OR, June 2018.

Technical Reports

[14] **Rykhlevskii, A.**, Huff, K. "Milestone 2.1 Report: Demonstration of SaltProc." **Advanced Reactors and Fuel Cycles Report Series**, Nuclear Plasma and Radiological Engineering, University of Illinois. Report UIUC-ARFC-2019-04, `https://doi.org/10.5281/zenodo.3355649` Jun. 2019.

Other Publications

[15] **Rykhlevskii, A.** Advanced online fuel reprocessing simulation for Thorium-fueled Molten Salt Breeder Reactor. M.Sc. Thesis. University of Illinois at Urbana-Champaign. May 2018.

Software Products

[16] **Rykhlevskii, A.**, Bae, J.W., Huff, K. "SaltProc v0.2." **zenodo**, July 2018. `http://dx.doi.org/10.5281/zenodo.1196454`.

[17] Lindsay, A., Huff, K., **Rykhlevskii, A.** "moltres v0.1." **zenodo**, June 2017. `http://dx.doi.org/10.5281/zenodo.801823`.

[18] Bates, C., Biondo, E., Brachem, C., Carlsen, R., Cary, J., Davis, A., Dembia, C., Elfring, M., Flanagan, R., Gidden, M., Haines, T., Howland, J., Huff, K., Jackson, S., Kiesling, K., Klebenow, M., Kuett, M., Manalo, K., M. McCormick, A. Opotowsky, C., Pavlovsky, R., Rabbani, M., Relson, E., Romano, P., **Rykhlevskii, A.**, Scopatz, A., Shriwise, P., Slaybaugh, R., Wilson, P., Xia, J., J. Zachman, C., and Zweig, M. "PyNE v0.5.11." **github**. github.com/pyne/pyne/releases/tag/0.5.11. March 2018.

Invited Talks

U. Illinois, Nuclear, Plasma, & Radiological Engineering. *Seminar.* **Apr 10, 2018**

Engineering Teaching

University of Illinois at Urbana-Champaign **Nov 29, 2017**
Guest Lecturer **Nov 9, 2018**
Dept. of Nuclear, Plasma, and Radiological Engineering
NPRE 247, Modeling Nuclear Energy System
UNIX Shell, Basic Scripting, Serpent usage, Monte Carlo methods

Undergraduate Researchers

Name	Degree - Year	Role
Jin Whan Bae	BS - 2017	Mentor
Louis Kissinger	BS - 2019	Mentor

Scientific Computing Skills

Languages Python, bash/csh, C++, FORTRAN, VB
Build Systems make, CMake
Version Control git
Other Tools Serpent, SCALE, MOOSE, MCNP, OpenMC, MATLAB, Octave, ANSYS, PyNE

Other University Service

Hack Mentor, Hack Illinois **2017**

Editing and Reviewing

Manuscript Referee *Annals of Nuclear Energy*
2019 GLOBAL International Fuel Cycle Conference

Professional Service

Member, American Nuclear Society **2016–present**
Member, Society for Industrial and Applied Mathematics **2018–present**