Andrei Rykhlevskii, Ph.D.

CONTACT INFORMATION	Postdoctoral Associate *Argonne National Laboratory* *Nuclear Science and Engineering*	mobile: (217) 305-2385 e-mail: andrewryh@gmail.com

RESEARCH INTERESTS

Nuclear reactors and fuel cycles analysis/optimization, reactor physics and multi-physics, stochastic neutronics, reactor conversion, High Performance Computing, uncertainty quantification

PHD

University of Illinois at Urbana-Champaign, NUCLEAR ENGINEERING **Aug 2016 − Jul 2020**
- Fuel processing simulation tool for liquid-fueled nuclear reactors
- 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

Argonne National Laboratory, Lemont, IL
Postdoctoral Associate, Core Design & Safety Analysis Group **Aug 2020 − Present**
- Performing neutronics calculation to reduce enrichment in research and test reactors

University of Illinois at Urbana-Champaign, Urbana, IL
Graduate Research Assistant, Advanced Reactors and Fuel Cycles Group **Aug 2016 − Aug 2020**
- Developed computational tools and models for advanced reactors and fuel cycles
- Investigated load-following capabilities of MSRs
- Modeled MSR neutronics using Monte Carlo code Serpent
- Created MSR models in multi-physics environment MOOSE
- Generated problem-oriented nuclear data libraries using Serpent, SCALE, OpenMC

Oak Ridge National 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 robots (C#, VB) for algorithmic trading

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	**2019-2020**
	American Nuclear Society, John and Muriel Landis Scholarship	**2017-2020**
	Podolsk city council innovative entrepreneurship award	**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] Ashraf, O., **Rykhlevskii, A.**, Tikhomirov, G.V., Huff, K.D. "Strategies for thorium fuel cycle transition in the SD-TMSR." **Annals of Nuclear Energy**, vol. 148. `https://doi.org/10.1016/j.anucene.2020.107656`, December 2020.

[2] Bae, J.W., **Rykhlevskii, A.**, Chee, G., Huff, K.D. "Deep Learning Approach to Nuclear Fuel Transmutation in a Fuel Cycle Simulator." **Annals of Nuclear Energy**, vol. 139. `https://doi.org/10.1016/j.anucene.2019.107230`, May 2020.

[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)." **Annals of Nuclear Energy**, vol. 137. `https://doi.org/10.1016/j.anucene.2019.107115`, March 2020.

[4] **Rykhlevskii, A.**, Bae, J.W., Huff, K. "Modeling And Simulation of Online Reprocessing in the Molten Salt Breeder Reactor." **Annals of Nuclear Energy**, vol. 128, Pages 366 - 379. `https://doi.org/10.1016/j.anucene.2019.01.030`, June 2019.

[5] 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. `doi.org/10.1016/j.anucene.2017.12.025`, April 2018.

SUBMITTED

[6] Ashraf, O., **Rykhlevskii, A.**, Tikhomirov, G.V., Huff, K.D. "Preliminary design of control rods in the single-fluid double-zone thorium molten salt reactor (SD-TMSR). Part I: Design development, material selection, and worth analysis." Submitted to **Progress in Nuclear Energy**, March 2020.

REFEREED CONFERENCE PROCEEDINGS

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

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

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

[10] **Rykhlevskii, A.**, Betzler, B.R., Worrall, A., Huff, K. "Fuel Cycle Performance of Fast Spectrum Molten Salt Reactors designs." **Proc. M&C 2019 - International Conference on Mathematics & Computational Methods Applied to Nuclear Science and Engineering.** Portland, OR, United States, August 25-29, 2019.

[11] **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 Meeting.** Washington, DC, United States, 2017.

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

[13] **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

[14] **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.

[15] **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.

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

Technical
Reports

[17] **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`, June 2019.

Other
Publications

[18] **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

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

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

[21] 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

Programming	Python, bash/csh, C++, FORTRAN, VB, MPI, OpenMP
Build Systems	make, CMake
Databases	HDF5, SQL
Test Frameworks	Travis CI, pytest
Version Control	git
Transport Software	Serpent, SCALE, MCNP, WIMS, CNCSN 2009, OpenMC
Other Tools	MOOSE, MATLAB/Octave, PyNE, CYCLUS, ANSYS CFX, Nek5000, LaTeX

Other
University
Service

Judge, HackIllinois	**2020**
Mentor, HackIllinois	**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**