Andrei Rykhlevskii, Ph.D.

CONTACT INFORMATION

Postdoctoral Appointee
Argonne National Laboratory
Nuclear Science and Engineering

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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 – Aug 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 Appointee, Core Design & Safety Analysis Group **Sep 2020 – present**

- Performing neutronics calculations for research reactors to support conversion from HEU to LEU

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. "Preliminary design of control rods in the single-fluid double-zone thorium molten salt reactor (SD-TMSR)." **Annals of Nuclear Energy**, vol. 152. `https://doi.org/10.1016/j.anucene.2020.108035`, March 2021.

[2] 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.

[3] 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.

[4] 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.

[5] **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.

[6] 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.

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.

Refereed Conference Abstracts

[13] **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.

[14] **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.

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

Technical Reports

[16] **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

[17] **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

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

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

[20] 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

ANS Winter 2020, Chicago, IL. *Lightning Talk.* **Nov 17, 2020**
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
Progress in 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**