

# Andrei Rykhlevskii, Ph.D.

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CONTACT INFORMATION	Nuclear Engineer <i>Argonne National Laboratory</i> <i>Research and Test Reactors</i>	mobile: (217) 305-2385 e-mail: andrewryh@gmail.com
RESEARCH INTERESTS	Advanced nuclear systems modeling/optimization, fast spectrum reactor designs, closed fuel cycle, data-driven optimization, stochastic neutronics, uncertainty quantification	
PhD	<b>University of Illinois at Urbana-Champaign, NUCLEAR ENGINEERING Aug 2016 – Aug 2020</b> <ul style="list-style-type: none"><li>• Fuel processing simulation tool for liquid-fueled nuclear reactors</li><li>• Advisor: Professor Kathryn D. Huff</li><li>• Concentration in Computational Science and Engineering</li></ul>	
MSc	<b>University of Illinois at Urbana-Champaign, NUCLEAR ENGINEERING Aug 2016 – May 2018</b> <ul style="list-style-type: none"><li>• Advanced online fuel reprocessing simulation for thorium-fueled Molten Salt Breeder Reactor</li><li>• Advisor: Professor Kathryn D. Huff</li></ul>	
MSc	<b>Financial University - Moscow, Russia, FINANCIAL MANAGEMENT Oct 2011 – Mar 2014</b> <ul style="list-style-type: none"><li>• Using stock market tools for IT-industry investments</li><li>• Advisor: Professor Svetlana Grishkina</li></ul>	
BSc	<b>Bauman Moscow State Technical University, NUCLEAR ENGINEERING Sep 2004 – Jun 2010</b> <ul style="list-style-type: none"><li>• Calculating structural materials activation for VVER-1200 decommissioning</li><li>• Minor actinide burning in BN-600 fast sodium reactor</li><li>• Majors: Nuclear Fuel Cycle, Computational Reactor Physics</li></ul>	
RESEARCH EXPERIENCE	<b>Argonne National Laboratory, Lemont, IL</b> <i>Nuclear Engineer, Core Design &amp; Safety Analysis Group</i> Jun 2021 – present <i>Postdoctoral Appointee, Core Design &amp; Safety Analysis Group</i> Sep 2020 – Jun 2021 <ul style="list-style-type: none"><li>• Performing neutronics calculations for research reactors to support conversion from HEU to LEU</li><li>• Developing tools for pre- and post-processing to facilitate MCNP and VESTA computations</li><li>• Analyzing reactivity initiated accidents in Belgian Reactor 2 (BR2)</li><li>• Designing irradiation experiments for new fuel designs</li></ul> <b>University of Illinois at Urbana-Champaign, Urbana, IL</b> <i>Graduate Research Assistant, Advanced Reactors and Fuel Cycles Group</i> Aug 2016 – Aug 2020 <ul style="list-style-type: none"><li>• Developed computational tools and models for advanced reactors and fuel cycles</li><li>• Investigated load-following capabilities of MSRs</li><li>• Modeled MSR neutronics using Monte Carlo code Serpent</li><li>• Created MSR models in multi-physics environment MOOSE</li><li>• Generated problem-oriented nuclear data libraries using Serpent, SCALE, OpenMC</li></ul> <b>Oak Ridge National Laboratory, Oak Ridge, TN</b> <i>NESLS Intern – Reactor Physics Group</i> May 2018 – Aug 2018 <ul style="list-style-type: none"><li>• Developed a various Fast Spectrum Molten Salt Reactor neutronics models (SCALE, Serpent)</li><li>• Implemented and tested continuous online separation and feeds for MSR</li><li>• Analyzed MSR fuel cycle performance in comparison with Sodium-cooled Fast Reactors</li></ul> <b>OKB GIDROPRESS (State Atomic Energy Corporation “ROSATOM”), Russia</b> <i>Lead Engineer</i> Dec 2015 – Jul 2016 Extending life cycle of Nuclear Power Plants (NPP) with VVER-440  <b>BUKO Ltd, Podolsk, Russia</b> Sep 2014 – Dec 2015 <i>Financial analyst</i> Developed and applied robots (C#, VB) for algorithmic trading  <b>Svyaz Standart Ltd, Podolsk, Russia</b> Feb 2012 – Aug 2014 <i>Chief Technology Officer</i> Designed and managed Internet Service Provider (ISP) metro networks  <b>OKB GIDROPRESS (State Atomic Energy Corporation “ROSATOM”), Russia</b> <i>Nuclear Engineer</i> Nov 2009 – Feb 2012 <ul style="list-style-type: none"><li>• Performed neutronics calculations for expending operation period of Balakovo and Kola NPPs</li><li>• Analyzed decommissioning for the Preliminary Safety Analysis Report of Belene NPP, Bulgaria</li></ul>	

- 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
BOOKS	[1] Dolan, T.J., Pázsit, I., <b>Rykhlevskii, A.</b> , Yoshioka, R. (In press) “Molten Salt Reactors and Thorium Energy.” Science & Technology Books Elsevier, Cambridge, MA, United States, 2023.	
JOURNAL PUBLICATIONS	[2] Ashraf, O., <b>Rykhlevskii, A.</b> , Tikhomirov, G.V., Huff, K.D. “Preliminary design of control rods in the single-fluid double-zone thorium molten salt reactor (SD-TMSR).” <b>Annals of Nuclear Energy</b> , vol. 152. <a href="https://doi.org/10.1016/j.anucene.2020.108035">https://doi.org/10.1016/j.anucene.2020.108035</a> , March 2021.	
	[3] Ashraf, O., <b>Rykhlevskii, A.</b> , Tikhomirov, G.V., Huff, K.D. “Strategies for thorium fuel cycle transition in the SD-TMSR.” <b>Annals of Nuclear Energy</b> , vol. 148. <a href="https://doi.org/10.1016/j.anucene.2020.107656">https://doi.org/10.1016/j.anucene.2020.107656</a> , December 2020.	
	[4] Bae, J.W., <b>Rykhlevskii, A.</b> , Chee, G., Huff, K.D. “Deep Learning Approach to Nuclear Fuel Transmutation in a Fuel Cycle Simulator.” <b>Annals of Nuclear Energy</b> , vol. 139. <a href="https://doi.org/10.1016/j.anucene.2019.107230">https://doi.org/10.1016/j.anucene.2019.107230</a> , May 2020.	
	[5] Ashraf, O., <b>Rykhlevskii, A.</b> , Tikhomirov, G.V., Huff, K.D. “Whole core analysis of the single-fluid double-zone thorium molten salt reactor (SD-TMSR).” <b>Annals of Nuclear Energy</b> , vol. 137. <a href="https://doi.org/10.1016/j.anucene.2019.107115">https://doi.org/10.1016/j.anucene.2019.107115</a> , March 2020.	
	[6] <b>Rykhlevskii, A.</b> , Bae, J.W., Huff, K. “Modeling And Simulation of Online Reprocessing in the Molten Salt Breeder Reactor.” <b>Annals of Nuclear Energy</b> , vol. 128, Pages 366 - 379. <a href="https://doi.org/10.1016/j.anucene.2019.01.030">https://doi.org/10.1016/j.anucene.2019.01.030</a> , June 2019.	
	[7] Lindsay, A., Ridley, G., <b>Rykhlevskii, A.</b> , Huff, K. “Introduction to Moltres: an Application for Simulation of Molten Salt Reactors.” <b>Annals of Nuclear Energy</b> , vol. 114, Pages 530 - 540. <a href="https://doi.org/10.1016/j.anucene.2017.12.025">doi.org/10.1016/j.anucene.2017.12.025</a> , April 2018.	
	[8] <b>Rykhlevskii, A.</b> , O’Grady, D., Kozlowski, T., Huff, K. “The Impact of Xenon-135 on Load Following Transatomic Power Molten Salt Reactor.” <b>Transactions of the American Nuclear Society Winter Meeting</b> . Washington, DC, United States, 2019.	
REFEREED CONFERENCE PROCEEDINGS	[9] Park, S.M., <b>Rykhlevskii, A.</b> , Huff, K. “Safety Analysis of the Molten Salt Fast Reactor Fuel Composition Using Moltres.” <b>Proc. GLOBAL International Fuel Cycle Conference</b> . Seattle, WA, United States, September 2019.	
	[10] Betzler, B.R., <b>Rykhlevskii, A.</b> , Worrall, A., Huff, K. “Impacts of Fast Spectrum Molten Salt Reactor Characteristics on Fuel Cycle Performance.” <b>Proc. GLOBAL International Fuel Cycle Conference</b> . Seattle, WA, United States, September 2019.	
	[11] <b>Rykhlevskii, A.</b> , Betzler, B.R., Worrall, A., Huff, K. “Fuel Cycle Performance of Fast Spectrum Molten Salt Reactors designs.” <b>Proc. M&amp;C 2019 - International Conference on Mathematics &amp; Computational Methods Applied to Nuclear Science and Engineering</b> . Portland, OR, United States, August 25-29, 2019.	
	[12] <b>Rykhlevskii, A.</b> , Lindsay, A., Huff, K. “Full-Core Analysis of Thorium-Fueled Molten Salt Breeder Reactor using the SERPENT 2 Monte Carlo code.” <b>Transactions of the American Nuclear Society Winter Meeting</b> . Washington, DC, United States, 2017.	
	[13] <b>Rykhlevskii, A.</b> , Lindsay, A., Huff, K. “Online Reprocessing Simulation for Thorium-Fueled Molten Salt Breeder Reactor.” <b>Transactions of the American Nuclear Society Winter Meeting</b> . Washington, DC, United States, 2017.	

REFEREED CONFERENCE ABSTRACTS	[14] <b>Rykhlevskii, A.</b> , Lindsay, A., Huff, K. “Simulation of Molten Salt Reactors with Moltres.” <b>2019 SIAM Conference on Computational Science and Engineering</b> , Spokane, WA, February 2019.	
	[15] <b>Rykhlevskii, A.</b> , Betzler, B.R., Bae, J.W., Huff, K. “Fuel Cycle Performance of Fast Spectrum Molten Salt Reactor Designs.” (poster) <b>Oak Ridge National Laboratory Nuclear Engineering Science Laboratory Synthesis Poster Session</b> . Oak Ridge, TN, United States, 2018.	
	[16] <b>Rykhlevskii, A.</b> , Huff, K. “Computational Tools for Advanced Molten Salt Reactor Simulation.” <b>Blue Waters Symposium</b> , Sun River, OR, June 2018.	
TECHNICAL REPORTS	[17] <b>Rykhlevskii, A.</b> et al. “Analysis of Reactivity Insertion Transients with Automatic Power Reduction by the Control Rods for the COBRA Lead Test Assembly.” Argonne National Laboratory, ANL/RTR/TM-22/15, August 2022.	
	[18] <b>Rykhlevskii, A.</b> et al. “MITR & NBSR DDE Irradiations in BR2 - Review of SCK CEN Preliminary Neutronics Evaluation of Irradiation Conditions.” Argonne National Laboratory, ANL/RTR/TM-22/11, July 2022.	
	[19] Aliberti, G., <b>Rykhlevskii, A.</b> “Testing and Verification of VESTA-2.1.5 Code for Software Quality Assurance (NQA-1).” Argonne National Laboratory, ANL/RTR/TM-21/35, Nov 2021.	
	[20] <b>Rykhlevskii, A.</b> et al. “Fuel Plate Irradiation in the FUTURE-5 Basket: Reactivity Insertion Transients with Automatic Power Reduction by the Control Rods.” Argonne National Laboratory, ANL/RTR/TM-21/20, September 2021.	
	[21] <b>Rykhlevskii, A.</b> , Bergeron, A., Puig, F. “FUTURE-HFIR Irradiation Test - Complementary Beginning of Cycle Neutronics Analysis.” Argonne National Laboratory, ANL/RTR/TM-21/4, March 2021.	
	[22] <b>Rykhlevskii, A.</b> , Huff, K. “Milestone 2.1 Report: Demonstration of SaltProc.” <b>Advanced Reactors and Fuel Cycles Report Series</b> , Nuclear Plasma and Radiological Engineering, University of Illinois. Report UIUC-ARFC-2019-04, <a href="https://doi.org/10.5281/zenodo.3355649">https://doi.org/10.5281/zenodo.3355649</a> , June 2019.	
OTHER PUBLICATIONS	[23] <b>Rykhlevskii, A.</b> Fuel processing simulation tool for liquid-fueled nuclear reactors. Ph.D. dissertation. University of Illinois at Urbana-Champaign. July 2020.	
	[24] <b>Rykhlevskii, A.</b> 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	[25] <b>Rykhlevskii, A.</b> , Bae, J.W., Huff, K. “SaltProc v0.2.” <b>zenodo</b> , July 2018. <a href="http://dx.doi.org/10.5281/zenodo.1196454">http://dx.doi.org/10.5281/zenodo.1196454</a> .	
	[26] Lindsay, A., Huff, K., <b>Rykhlevskii, A.</b> “moltres v0.1.” <b>zenodo</b> , June 2017. <a href="http://dx.doi.org/10.5281/zenodo.801823">http://dx.doi.org/10.5281/zenodo.801823</a> .	
	[27] 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. Opatowsky, C., Pavlovsky, R., Rabbani, M., Relson, E., Romano, P., <b>Rykhlevskii, A.</b> , Scopatz, A., Shriwise, P., Slaybaugh, R., Wilson, P., Xia, J., J. Zachman, C., and Zweig, M. “PyNE v0.5.11.” <b>github</b> . <a href="https://github.com/pyne/pyne/releases/tag/0.5.11">github.com/pyne/pyne/releases/tag/0.5.11</a> . March 2018.	
INVITED TALKS	<b>ANS Winter 2020</b> , Chicago, IL. <i>Lightning Talk</i> . <b>U. Illinois</b> , Nuclear, Plasma, & Radiological Engineering. <i>Seminar</i> .	<b>Nov 17, 2020</b> <b>Apr 10, 2018</b>
ENGINEERING TEACHING	<b>University of Illinois at Urbana-Champaign</b> <i>Guest Lecturer</i> DEPT. OF NUCLEAR, PLASMA, AND RADIOLOGICAL ENGINEERING <i>NPRE 247, Modeling Nuclear Energy System</i> UNIX Shell, Basic Scripting, Serpent usage, Monte Carlo methods	<b>Nov 29, 2017</b> <b>Nov 9, 2018</b>
UNDERGRADUATE RESEARCHERS	<u>NAME</u> <b>Jin Whan Bae</b> <b>Louis Kissinger</b>	<u>DEGREE - YEAR</u> BS - 2017 BS - 2019
		<u>ROLE</u> Mentor Mentor

GRADUATE RESEARCHERS	<u>NAME</u>	<u>DEGREE - YEAR</u>	<u>ROLE</u>
	<b>Gwendolyn Chee</b>	PhD - 2022	Mentor
	<b>Anshuman Chaube</b>	PhD - (est. 2022)	Mentor
	<b>Sun Myung Park</b>	PhD - (est. 2022)	Mentor
SCIENTIFIC COMPUTING SKILLS	<b>Programming</b>	Python, bash/csh, C++, FORTRAN, VB, MPI, OpenMP	
	<b>Build Systems</b>	make, CMake	
	<b>Databases</b>	PyTables, HDF5, SQL	
	<b>Test Frameworks</b>	Travis CI, pytest	
	<b>Version Control</b>	git	
	<b>Transport Software</b>	MCNP, VESTA, OpenMC, Serpent, SCALE, WIMS, CNCSN 2009	
	<b>Other Tools</b>	PARET/ANL, MOOSE, MATLAB/Octave, PyNE, CYCLUS, ANSYS CFX, L <sup>A</sup> T <sub>E</sub> X	
OTHER UNIVERSITY SERVICE	<b>Judge</b> , HackIllinois		<b>2020</b>
	<b>Mentor</b> , HackIllinois		<b>2017</b>
EDITING AND REVIEWING	<b>Manuscript Referee</b>	<i>Annals of Nuclear Energy</i>	
		<i>Progress in Nuclear Energy</i>	
		<i>2019 GLOBAL International Fuel Cycle Conference</i>	