# Andrei Rykhlevskii

**Contact Information**

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

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**Research Interests**

Nuclear systems modeling and analysis, reactor physics, neutron transport, Verification & Validation, neutronics and fuel cycle performance and optimization, transition to advanced reactors/fuel cycles

**PhD**

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

**Honors and Awards**

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|---|---:|
| 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** |

**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 reactors and fuel cycles
- Investigating load-following capabilities for MSRs
- Modeling MSR 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 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

JOURNAL
PUBLICATIONS

[1] 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**, `https://doi.org/10.1016/j.anucene.2019.107115`, October 2019.

[2] **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.

[3] 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

[4] Ashraf, O., **Rykhlevskii, A.**, Tikhomirov, G.V., Huff, K.D. "Strategies for thorium fuel cycle transition in the SD-TMSR." Submitted to **Annals of Nuclear Energy**, November 2019.

[5] 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** (accepted), November 2019.

REFEREED
CONFERENCE
PROCEEDINGS

[6] **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.

[7] 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.

[8] 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.

[9] **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.

[10] **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.

[11] **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.

[12] **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

[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 | **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

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

OTHER UNIVERSITY SERVICE

**Hack Mentor**, Hack Illinois      **2017**