



# Curriculum Vitae

## Sooyoung Choi

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### AFFILIATION

Postdoctoral Research Associate  
Computational Reactor Physics and Experiment Laboratory (CORE)  
Research Division of Mechanical, Aerospace and Nuclear Engineering  
Ulsan National Institute of Science and Technology (UNIST)  
50 UNIST-gil, Ulsan 44919, Republic of Korea

### EDUCATION

- **Doctor of Engineering**
  - UNIST (2013.03 ~ 2017.02, 4 years)
  - Major: Nuclear Engineering
  - Advisor: Prof. Deokjung Lee
  - Ph.D. Thesis: Pin-based Pointwise Energy Slowing-down Method for Resonance Self-shielding Calculation
- **Bachelor of Engineering**
  - UNIST (2010.03 ~ 2013.02, 3 years)
  - Major: Nuclear Science & Engineering, Thermo- Fluid & Power Engineering

### WORK EXPERIENCE

- **UNIST CORE, Postdoctoral Research Associate (2017.03 ~ Current)**
  - Main developer of neutron transport analysis code STREAM
    - 3D transport calculation and multi-physics coupled whole core calculation.
- **Argonne National Laboratory, Research Aide (2015.07 ~ 2015.12)**
  - Resonance self-shielding method development
  - ETOE-2/MC<sup>2</sup>-3 library generation
- **UNIST CORE, Ph.D. Candidate (2013.03 ~ 2017.02)**
  - Main developer of neutron transport analysis code STREAM:
    - Generation of multi-group cross section library, resonance treatment, neutron transport calculation, depletion, and thermal/hydraulic coupling

### RESEARCH INTERESTS

- Resonance Self-shielding Calculation
- Neutron Transport Calculation
- Multi-physics coupled whole core calculation

### CERTIFICATES

- **Awards & Scholarship**
  - Best student papers award, Reactor Physics Asia 2017 conference (August, 2017)
  - Award for contribution to society – Bronze prize, Korean Nuclear Society (October, 2015)

- Excellent conference paper prize, Korean Nuclear Society (May, 2015)
  - The first prize in student and youth competition session, Korean Nuclear Society (May, 2014)
  - National natural sciences and engineering scholarship, Korean Student Aid Foundation (March, 2010 - February, 2013)
  - Nuclear Technology Undergraduate Student Society Scholarship, National Research Foundation of Korea (June, 2012 - February, 2013)
- **Training (International)**
    - Advanced Visual MCNP6 Workshop (Barcelona, Spain, April, 2015)
    - MCNP Intermediate Workshop (Paris, France, March, 2015)
    - SCALE training - TRITON & ORIGEN, Oak Ridge National Laboratory (Oak Ridge, USA, April, 2013)
    - Research reactor Kyoto University Critical Assembly (KUCA) Experiment, Kyoto University (Osaka, July, 2013)
    - SCALE training - KENO & TSUNAMI, Oak Ridge National Laboratory (Oak Ridge, USA, August, 2014)
  - **Training (Domestic)**
    - McCARD developer training course, Seoul National University (SNU, March, 2015)
    - MPI (KISTI, February, 2015)
    - Openmp (KISTI, January, 2015)
    - Fluent solver basic (TSNE, December, 2014)
    - LWR refueling core design training, KHNP CRI (HYU, July, 2014)
    - Basic theory and programming practice of nuclear reactor design and analysis with Monte Carlo method (INTEC, January, 2014)
    - McCARD user training course, Seoul National University (SNU, August, 2013)
    - Whole core transport analysis seminar, KAERI (Muju, March, 2013)
  - **Membership**
    - Korean Nuclear Society Student Member (March, 2013)

## PUBLICATIONS

- **SCI Journal (11 papers published; 4 papers under review)**
  1. **Sooyoung Choi**, Kord Smith, Hanjoo Kim, Taewoo Tak, Deokjung Lee, “On the Diffusion Coefficient Calculation in Two-step Light Water Reactor Core analysis,” *J. Nucl. Sci. Technol.*, 54 (6): 705-715, 2017. <http://dx.doi.org/10.1080/00223131.2017.1299648>
  2. **Sooyoung Choi**, Changho Lee, Deokjung Lee, “Resonance Treatment using Pin-Based Pointwise Energy Slowing-Down Method,” *J. Comput. Phys.*, 330: 134-155, 2017. <http://dx.doi.org/10.1016/j.jcp.2016.11.007>
  3. **Sooyoung Choi**, Azamat Khassenov, Deokjung Lee, “Resonance Self-Shielding Method Using Resonance Interference Factor Library for Practical Lattice Physics Computations of LWRs,” *J. Nucl. Sci. Technol.*, 53 (8): 1142-1154, 2016. <http://dx.doi.org/10.1080/00223131.2015.1095686>
  4. **Sooyoung Choi**, Kord Smith, Hyun Chul Lee, Deokjung Lee, “Impact of Inflow Transport Approximation on Reactor Light Water Reactor Analysis,” *J. Comput. Phys.*, 299: 352-373, 2015. <http://dx.doi.org/10.1016/j.jcp.2015.07.005>
  5. **Sooyoung Choi**, Hyunsuk Lee, Ser Gi Hong, Deokjung Lee, “Resonance

- Self-Shielding Methodology of New Neutron Transport Code STREAM,” *J. Nucl. Sci. Technol.*, 52(9): 1133-1150, 2015. <http://dx.doi.org/10.1080/00223131.2014.993738>
6. **Sooyoung Choi**, Chidong Kong, Deokjung Lee, Mark L. Williams, “A New Equivalence theory Method for Treating Doubly Heterogeneous Fuel – II: Verifications,” *Nucl. Sci. Eng.*, 180(1): 41-57, 2015. <http://dx.doi.org/10.13182/NSE14-72>
  7. Eun Jeong, Jinsu Park, Hyun Chul Lee, Peng Zhang, Jiankai Yu, Matthieu Lemaire, **Sooyoung Choi**, Deokjung Lee, “Verification of DeCART2D/CAPP Code System for VHTR Analysis with PMR-200 Benchmark,” *Ann. Nucl. Energy*, Under review (2018)
  8. Tuan Quoc Tran, Sanggeol Jeong, Khang Nhat Hoang Nguyen, Hyunsuk Lee, **Sooyoung Choi**, Peng Zhang, Min Jae Lee, Jae-Yong Lim, Deokjung Lee, “Validation of the MCNP6 code for SFR shielding design analysis”. *J. Radiol. Prot.*, Under review (2018)
  9. Jinsu Park, Wonkyeong Kim, **Sooyoung Choi**, Jiankai Yu, DeokjungLee, “Comparative Analysis of VERA Depletion Benchmark through Consistent Code-to-Code Comparison,” *Ann. Nucl. Energy*, Under review (2018)
  10. Bamidele Ebiwonjumi, **Sooyoung Choi**, Matthieu Lemaire, Deokjung Lee, Ho Cheol Shin, “Validation of Lattice Physics Code STREAM for Predicting Pressurized Water Reactor Spent Nuclear Fuel Isotopic Inventory,” *Ann. Nucl. Energy*, Under review (2018)
  11. Youqi Zheng, **Sooyoung Choi**, Deokjung Lee, “A New Approach to Three-Dimensional Neutron Transport Solution Based on the Method of Characteristics and Linear Axial Approximation,” *J. Comput. Phys.*, 350(1): 25-44, 2017. <https://doi.org/10.1016/j.jcp.2017.08.026>
  12. Hanjoo Kim, **Sooyoung Choi**, Minyong Park, Deokjung Lee, Hyun Chul Lee, "Extension of Double Heterogeneity Treatment Method for Coated TRISO fuel particles," *Ann. Nucl. Energy*, 99: 124-135, 2016. <http://dx.doi.org/10.1016/j.anucene.2016.07.026>
  13. Mark L. Williams, **Sooyoung Choi**, Deokjung Lee, “A New Equivalence theory Method for Treating Doubly Heterogeneous Fuel – I: Theory,” *Nucl. Sci. Eng.*, 180(1): 30-40, 2015. <http://dx.doi.org/10.13182/NSE14-68>
  14. Hyunsuk Lee, **Sooyoung Choi**, Deokjung Lee, “A Hybrid Monte Carlo/Method-of-Characteristics Method for Efficient Neutron Transport Analysis,” *Nucl. Sci. Eng.*, 180(1): 69-85, 2015. <http://dx.doi.org/10.13182/NSE13-102>
  15. Hyunsuk Lee, **Sooyoung Choi**, Kyoong Ho Cha, Kwangho Lee, Deokjung Lee, “New Calculational Model for Self-Powered Neutron Detector Based on Monte Carlo Simulation,” *J. Nucl. Sci. Technol.*, 52(5): 660-669, 2015. <http://dx.doi.org/10.1080/00223131.2014.975766>

■ **International Topical Meeting (15 papers)**

1. **Sooyoung Choi**, Changho Lee, Deokjung Lee, “Improved Resonance Self-shielding Method Considering Resonance Scattering Effect,” *PHYSOR2016*, Idaho, USA, May 1-5, 2016.
2. **Sooyoung Choi**, Kord Smith, Deokjung Lee, “Investigation of Diffusion

- Coefficient Calculation Methods for Two-Step LWR Analysis,” *PHYSOR2016*, Idaho, USA, May 1-5, 2016.
3. **Sooyoung Choi**, Azamat Khassenov, Deokjung Lee, “Resonance Interference Method in Lattice Physics Code STREAM,” *ICONE-23*, Chiba, Japan, May 17-21, 2015.
  4. **Sooyoung Choi**, Kord Smith, Deokjung Lee, “Impact of Inflow Transport Approximation on Reactor Analysis,” *M&C2015*, Nashville, TN, USA, April 19-23, 2015.
  5. **Sooyoung Choi**, Mark L. Williams, Deokjung Lee, “Verification of Doubly-Heterogeneous Self-shielding Method Based on Equivalence Theory,” *PHYSOR2014*, Kyoto, Japan, September 28 - October 3, 2014.
  6. Khang Hoang Nhat Nguyen, **Sooyoung Choi**, Matthieu Lemaire, Deokjung Lee, “ENDF/B-VII Depletion Library Compression to Optimize the Computational Efficiency in STREAM Code,” *PHYSOR2018*, Cancun, Mexico, April 22-26, 2018.
  7. Tran Quoc Tuan, Sanggeol Jeong, Nguyen Hoang Nhat Khang, Hyunsuk Lee, **Sooyoung Choi**, Peng Zhang, Min Jae Lee, Jae-Yong Lim, Deokjung Lee, “Evaluation of the MCNP6 code for SFR shielding analysis,” *PHYSOR2018*, Cancun, Mexico, April 22-26, 2018.
  8. Hyunsuk Lee, Wonkyeong Kim, Peng Zhang, Azamat Khassenov, Jinsu Park, Jiankai Yu, **Sooyoung Choi**, Hwan Soo Lee, Deokjung Lee, “Preliminary Simulation Results of BEAVRS Three-dimensional Cycle 1 Wholecore Depletion by UNIST Monte Carlo Code MCS,” *M&C2017*, Jeju, Korea, April 16-20, 2017.
  9. Wonkyeong Kim, Hyunsuk Lee, **Sooyoung Choi**, Ji-Eun Jung, Deokjung Lee, “Hybrid Depletion Method for the Light Water Reactor analysis,” *M&C2017*, Jeju, Korea, April 16-20, 2017.
  10. Bamidele Ebiwonjumi, **Sooyoung Choi**, Deokjung Lee, Ho Cheol Shin, “Verification and Validation of STREAM Source Term Calculation Capability,” *M&C2017*, Jeju, Korea, April 16-20, 2017.
  11. Hanjoo Kim, Kiho Kim, **Sooyoung Choi**, Hyunsuk Lee, Deokjung Lee, “Analysis of NCA Tungsten Critical Experiment by New Monte Carlo Code,” *PHYSOR2016*, Idaho, USA, May 1-5, 2016.
  12. Chidong Kong, **Sooyoung Choi**, Deokjung Lee, “Deterministic Lattice Code Development at UNIST,” *PHYSOR2014*, Kyoto, Japan, September 28 - October 3, 2014.
  13. Yongjin Jeong, **Sooyoung Choi**, Deokjung Lee, “Development of Computer Code Packages for Molten Salt Reactor Core Analysis,” *PHYSOR2014*, Kyoto, Japan, September 28 - October 3, 2014.
  14. Hyunsuk Lee, **Sooyoung Choi**, Si Hwan Kim, Seokjean Lyou, Deokjung Lee, “Development of MCNPX Model for Boronometer,” *ISSNP2013*, Beijing, China, November 22-24, 2013.
  15. Jiwon Choe, Minyong Park, **Sooyoung Choi**, Taewoo Tak, Deokjung Lee, “Upgrade of Mode-K Strategy for Load-Follow Operation of OPR1000,” *ISSNP2013*, Beijing, China, November 22-24, 2013.

■ **International and Domestic Conferences (42 papers)**

1. **Sooyoung Choi**, Deokjung Lee, “Efficient Parallelization Strategy of STREAM for Three-dimensional Whole-core Neutron Transport Calculation,” *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
2. **Sooyoung Choi**, JiwonChoe, Jaerim Jang, Deokjung Lee, “Extension of PSM for Ring-type Burnable Absorber Con-taining Resonant Nuclides,” *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
3. **Sooyoung Choi**, Jiwon Choe, Deokjung Lee, “Incorporation of Collision Probability Method in STREAM to Consider Non-uniform Material Composition in Fuel Subregions,” *KNS Autumn Meeting*, Gyeongju, Korea, October 27-28, 2016.
4. **Sooyoung Choi**, Minyong Park, Youqi Zheng, Chidong Kong, Jiwon Choe, Hanjoo Kim, Kiho Kim, Ho Cheol Shin, Deokjung Lee, “Development Status of Reactor Physics Code Suite in UNIST,” *Croatian Nuclear Society*, Zadar, Croatia, June 5-8, 2016.
5. **Sooyoung Choi**, Changho Lee, Deokjung Lee, “Enhanced Resonance Self-shielding Method in Lattice Physics Code STREAM,” *KNS Spring Meeting*, Jeju, Korea, May 12-13, 2016.
6. **Sooyoung Choi**, Deokjung Lee, “Recent Developments of Lattice Physics Code STREAM,” *KNS Spring Meeting*, Jeju, May 6-8, 2015.
7. **Sooyoung Choi**, Chidong Kong, Azamat Khassenov, Deokjung Lee, “Methodology and Verification of Neutron Transport Code STREAM for Analysis of Innovative Reactor Core Design,” *International Symposium on NPP Technology and HRD*, Busan, Korea, November 28, 2014.
8. **Sooyoung Choi**, Azamat Khassenov, Deokjung Lee, “Resonance Self-Shielding Method with Resonance Interference Factor Library,” *ANS Winter Meeting*, Anaheim, CA, November 9-13, 2014.
9. **Sooyoung Choi**, Azamat Khassenov, Deokjung Lee, “Improvement of Resonance Interference Treatment in STREAM,” *KNS Autumn Meeting*, Pyeongchang, Korea, October 30-31, 2014.
10. **Sooyoung Choi**, Mark L. Williams, Deokjung Lee, “A New Equivalence Theory Method for Doubly Heterogeneous Fuel,” *KNS Spring Meeting*, Jeju Korea, May 28-30, 2014.
11. **Sooyoung Choi**, Chidong Kong, Deokjung Lee, “Status of Deterministic Transport Code Development at UNIST,” *KNS Autumn Meeting*, Gyeongju, October 23-25, 2013.
12. **Sooyoung Choi**, Jiwon Choe, Deokjung Lee, “On the Fuel Escape Probability Approximation of Equivalence Theory,” *ANS Winter Meeting*, Washington D.C., November 10-14, 2013.
13. Jiwon Choe, **Sooyoung Choi**, Deokjung Lee, “Analysis of Effective Gadolinium Depletion Model,” *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
14. Kiho Kim, **Sooyoung Choi**, Deokjung Lee, “Validation of Ultra-Fine Group Library Generation of Lead-cooled Fast Reactor for STREAM code,” *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
15. Peng Zhang, Jiwon Choe, **Sooyoung Choi**, Deokjung Lee, “Burnup Adaptation Model in STREAM/RASTK Code System,” *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
16. Jiankai Yu, **Sooyoung Choi**, Yongmin Jo, Peng Zhang, Wanlin Li, Kan Wang,

- Deokjung Lee, "Implicit Resonance Self-Shielding Effect of Multi-Group Covariance in RXSP code," *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018
17. Khang H.N. Nguyen, **Sooyoung Choi**, Deokjung Lee, "Optimization of STREAM Burnup Chain using Depletion Perturbation Theory," *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
  18. Tuan Quoc Tran, Hyunsuk Lee, Jiwon Choe, Yongmin Jo, **Sooyoung Choi**, Hwan Soo Lee, Ho Cheol Shin, Deokjung Lee, "Application of MCS Code to Yonggwang Unit 3 Cycle 1 BOC Analysis," *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
  19. Yongmin Jo, **Sooyoung Choi**, Jiwon Choe, Woonghee Lee, Jiankai Yu, Deokjung Lee, "Uncertainty Quantification of LWRs by Random Sampling Method with STREAM/RASTK", *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
  20. Woonghee Lee, **Sooyoung Choi**, Jiankai Yu and Deokjung Lee, "Sensitivity and Uncertainty Analysis on TMI-1 PWR Pin Cell with STREAM," *KNS Spring Meeting*, Jeju, Korea, May 16-18, 2018.
  21. Khang Nguyen, JiwonChoe, **Sooyoung Choi**, Hyunsuk Lee, Wonkyeong Kim, Deokjung Lee, Matthieu Lemaire, "Verification of STREAM and MCS against OPR FA depletion calculation," *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
  22. Jiwon Choe, **Sooyoung Choi**, Minyong Park, Peng Zhang, Ho Cheol Shin, Hwan Soo Lee, Deokjung Lee, "Validation of the UNIST STREAM/RAST-K Code System with OPR -1000 Multi-cycle Operation," *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
  23. Eun Jeong, **Sooyoung Choi**, Ho Cheol Shin, Ji Eun Jeong, Hwan Soo Lee, Deokjung Lee, "Verification of Kinetics Parameters Calculation Capability in STREAM MOC Code," *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
  24. Jaerim Jang, Jiwon Choe, **Sooyoung Choi**, Hyunsuk Lee, Bamidele Ebiwonjumi, Ho Cheol Shin, Deokjung Lee, "Boron-free SMPWR Analysis with MCS and STREAM codes," *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
  25. Woonghee Lee, **Sooyoung Choi**, Bamidele Ebiwonjumi, Matthieu Lemaire, "Implementation of On-The-Fly Energy Release per Fission Model in STREAM," *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
  26. Bamidele Ebiwonjumi, **Sooyoung Choi**, Matthieu Lemaire, Deokjung Lee, Ho Cheol Shin, "Experimental Validation of STREAM for Spent Nuclear Fuel Applications," *RPHA17*, Chengdu, Sichuan, China, August 24-25, 2017.
  27. Seongpil Yum, Jiwon Choe, **Sooyoung Choi**, Deokjung Lee, "Pin-by-pin Core Calculation with SPH Factor for Improving Accuracy of Pinwise Calculation", *KNS Spring Meeting*, Jeju, Korea, May 17-19, 2017.
  28. Youqi Zheng, **Sooyoung Choi**, Deokjung Lee, "New Three-Dimensional Neutron Transport Calculation Capability in STREAM Code," *KNS Autumn Meeting*, Gyeongju, Korea, October 27-28, 2016.
  29. Hanjoo Kim, **Sooyoung Choi**, Deokjung Lee, Hyun Chul Lee, "Extension of STREAM Double Heterogeneity Method to Coated TRISO Particles", *KNS Spring Meeting*, Jeju, Korea, May 11-13, 2016.
  30. Deokjung Lee, **Sooyoung Choi**, and Kord Smith, "On the Diffusion Coefficient

- of Two-step Method for LWR analysis,” *KNS Autumn Meeting*, Gyeongju, October 28-30, 2015.
31. Azamat Khassenov, **Sooyoung Choi**, Hyunsuk Lee, Peng Zhang, Youqi Zheng, Deokjung Lee, “Preliminary Performance Evaluation of On-the-Fly Doppler Broadening Capability for Monte Carlo Simulation in MCS,” *7ICMSNSE*, Ottawa, Canada, October 18-21, 2015.
  32. Yongjin Jeong, **Sooyoung Choi**, Hyunsuk Lee, Kyoon-Ho Cha, Sun-Kwan Hong, Deokjung Lee, “Hybrid Depletion Method for Monte Carlo Analysis of PWRs,” *RPHA15*, Jeju, Korea, September 16-18, 2015.
  33. Kiho Kim, Hanjoo Kim, **Sooyoung Choi**, Hyunsuk Lee, Deokjung Lee, “Benchmark Analysis of NCA Tungsten Critical Experiment,” *RPHA15*, Jeju, Korea, September 16-18, 2015.
  34. Jiwon Choe, Chidong Kong, **Sooyoung Choi**, Minyong Park, Deokjung Lee, and Ho Cheol Shin, “Preliminary Analysis of New Secondary Shutdown System of Small Modular Pressurized Water Reactor,” *RPHA15*, Jeju, Korea, September 16-18, 2015.
  35. Azamat Khassenov, **Sooyoung Choi**, Deokjung Lee, “On the Fly Doppler Broadening Using Multipole Representation,” *KNS Spring Meeting*, Jeju, May 6-8, 2015.
  36. Azamat Khassenov, **Sooyoung Choi**, Deokjung Lee, “Application of Energy Window Concept in Doppler Broadening of  $^{238}\text{U}$  Cross Section,” *KNS Autumn Meeting*, Pyeongchang, Korea, October 30-31, 2014.
  37. Yongjin Jeong, **Sooyoung Choi**, Deokjung Lee, “Molten Salt Breeder Reactor Analysis Based on Unit Cell Model,” *KNS Spring Meeting*, Jeju, Korea, May 28-30, 2014.
  38. Chidong Kong, **Sooyoung Choi**, Minyong Park, Deokjung Lee, “Application of Nuclear Power Plant Simulator for High School Student Training,” *KNS Autumn Meeting*, Pyeongchang, Korea, October 30-31, 2014.
  39. Chidong Kong, **Sooyoung Choi**, Deokjung Lee, “Method of Characteristics Code Development at UNIST,” *ANS Annual Meeting*, Reno, NV, June 15-19, 2014.
  40. Jiwon Choe, Minyong Park, **Sooyoung Choi**, Taewoo Tak, Deokjung Lee, “Application of Mode-K Strategy to Daily Load-Follow Operation of OPR1000,” *ANS Winter Meeting*, Washington D.C., November 10-14, 2013.
  41. Hyunsuk Lee, **Sooyoung Choi**, Deokjung Lee, “Development of Boron Meter Model with MCNPX,” *KNS Autumn Meeting*, Gyeongju, October 23-25, 2013.
  42. Hyunsuk Lee, Chidong Kong, **Sooyoung Choi**, Deokjung Lee, “Hybrid Method of MOC and MC for Efficient Continuous Energy Neutron Transport Analysis,” *ANS Annual Meeting*, Atlanta, GA, June 16-20, 2013.

## PATENT

1. Deokjung Lee, **Sooyoung Choi**, Pin-based pointwise energy slowing-down calculation for effective multi-group calculation, Patent application number: 10-2017-0054540, 2017.
2. Deokjung Lee, Wonkyeong Kim, **Sooyoung Choi**, Hyunsuk Lee, Hybrid depletion method for light water reactor analysis, Patent application number: 10-2017-0059904, 2017.