

Curriculum Vitae

Jiwon Choe

M. +82-10-3807-9210 / T. +82-52-217-3006 / F. +82-52-217-2429 / chi91023@unist.ac.kr

Affiliation

6th semester in the Doctoral Program
Ulsan National Institute of Science & Technology (UNIST)
UNIST-gil 50, Ulsan Metropolitan City, Republic of Korea, 44919

Education

Master

- Major: Nuclear Engineering
- UNIST, Ulsan, Korea, 2013.9 – 2015.8
- Thesis Topic: New Burnable Absorber and Zirconium Reflector for Advanced PWRs
- Advisor: Prof. Deokjung Lee, Ph. D. (UNIST)

Bachelor of Engineering

- Major: Nuclear Science and Engineering
- Major: Mechanical System Design and Manufacturing
- UNIST, Ulsan, Korea, 2010.3 –2013.8

Work Experience

- Methodology Development and Programming
 - 2-step approach for PWR core design
 - Group constant generation for nodal code
 - Acceleration of calculation speed by CPM
- Design study of Small Modular Reactor
 - Lead cooled fast reactor design for nuclear propulsion
 - Boron-free small modular pressurized water reactor
 - Development of design requirements for SMR
 - Long life small modular sodium cooled fast reactor (SMSFR)
- Design study of Pressurized Water Reactor
 - Hybrid burnable absorber
 - Low-boron operation core design
 - Core economic analysis
- Load follow operation method development
 - Load follow simulation module development
 - Implement of mode-K load follow method
- Internships
 - Nuclear Engineering Division, ANL (July 2014)
 - Sodium-cooled Fast Reactor Development Agency, KAERI (July 2012)
- Experience
 - Session chair, PBNC2016 (April 2016)
 - Session chair, ICAPP 2015 (May 2015)

- Featured Skills
 - Nuclear Physics Codes:
CASMO/SIMULATE (Studsvik), MC²-3/REBUS (ANL), STREAM/RAST-K (UNIST), DeCART/MASTER (KAERI), HELIOS (Scandpower), MCS (UNIST), SERPENT (VTT), MCNP (LANL)
 - Programming Languages:
Fortran, Matlab, Shell, Python, C/C++
 - Computer Tools:
Vim, SourceTree, GitHub, MS Office (Power Point, Word, Excel), CATIA, Mathematica

Research Interests

- Development of 2-step method approach for PWR core design
- Small modular reactor design
- Sodium-cooled Fast Reactor design
- Development design requirement for SMR
- Development low-boron operating PWR
- Load follow operation method development

Certificates

- Awards & Scholarship
 - KNS Curie Student Award (October 2016)
 - Best Poster Prize of PBNC2016 (Beijing, China, April 2016)
 - Prize of Excellent Research: Interdisciplinary Project for Graduation in UNIST (June 2013)
 - Nuclear Technology Undergraduate Student Society Scholarship, National Research Foundation of Korea (June 2012 – February 2013)
- Training (International)
 - SARAX Workshop in PHYSOR 2018 (Cancun, Mexico, April 2018)
 - POSTECH Experiments (KUCA, Japan, December 2016)
 - CASMO-SIMULATE Training (Studsvik, MA, USA, May 2015)
 - RELAP5/SCDAP Training (West Yellowstone, MT, USA, May 2015)
 - MIT short program: Nuclear Plant Safety (MA, USA, June 2014)
 - Korea-Japan Joint Summer School (KURRI, Japan, August 2012)
- Training (Domestic)
 - High Accuracy & Multi-Physics Nuclear Power Plant Design (Daejeon, August 2016)
 - Training for nuclear plant system using PC based simulator (Daejeon, August 2016)
 - Advanced Visual MCNP6 Workshop (Daejeon, November 2015)
 - Reactor core design: theory and practice, KAERI (Daejeon, July 2015)
 - Training on Criticality Analysis of Spent Nuclear Fuel (Daejeon, June 2015)
 - McCARD developers' training (Seoul, March 2015)
 - Simulink for System and Algorithm Modeling, MathWorks training services (Seoul, September 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)
- Linux System / Network Programming, Samsung SDS (Seoul, August 2013)
- Symbolic Computing Package for Mathematica, Dahan Tech. Inc. (Seoul, July 2013)
- MATLAB Parallel Computing Seminar, MathWorks training services, (UNIST, July 2013)
- MATLAB Based Optimization Techniques, MathWorks training services (Seoul, July 2013)
- Interfacing MATLAB with C Code, MathWorks training services (Seoul, April 2013)
- Whole core transport analysis seminar, KAERI (Muju, March 2013)
- High Performance Computing Winter School, KISTI (UNIST, February 2013)
- Education reactor AGN-201K (10W) Experiment, Kyunghee University (KHU, August 2012)
- Membership
 - Korean Nuclear Society Student Member (November 2012 –)

Publications SCI Journal

1. **Jiwon Choe**, Sooyoung Choi, Peng Zhang, Jinsu Park, Wonkyeong Kim, Ho Cheol Shin, Hwan Soo Lee, Ji-Eun Jung, Deokjung Lee, "Verification and Validation of STREAM/RAST-K for PWR Analysis," Nucl. Eng. Tech., Under Review (2018)
2. **Jiwon Choe**, Deokjung Lee, and Ho Cheol Shin, "Boron-Free Small Modular Pressurized Water Reactor Design with New Burnable Absorber," Int. J. Energ. Res., 40 (15): 2128–2135. <http://dx.doi.org/10.1002/er.3590> (2016)
3. **Jiwon Choe**, Deokjung Lee, Jieun Jeong, and Ho Cheol Shin, "Performance evaluation of Zircaloy reflector for pressurized water reactors," Int. J. Energ. Res., 40 (2): 160-167. <http://dx.doi.org/10.1002/er.3443> (2016)
4. **Jiwon Choe**, Deokjung Lee, Ho Cheol Shin, "New Burnable Absorber for Long-Cycle Low Boron Operation of PWRs," Annals of Nuclear Energy, 88: 272-279. <http://dx.doi.org/10.1016/j.anucene.2015.11.011> (2016)
5. Peng Zhang, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Jiankai Yu, Farrokh Khoshahval, Deokjung Lee, "New Preprocessing Method for Generalized Eigenvalue Problem of Monte Carlo Modified Power Method," Comput. Phys. Commun., Revision (2018)
6. Chidong Kong, **Jiwon Choe**, Seongpil Yum, Jaerim Jang, Woonghee Lee, Hanjoo Kim, Wonkyeong Kim, Nguyen Hoang Nhat Khang, Nguyen Dong Cao Tung, Vutheam Dos, Deokjung Lee, Ho Cheol Shin, Masao Yamanaka, and Cheol Ho Pyeon, "Application of Advanced Rossi-alpha Technique to Reactivity Measurements at Kyoto University Critical Assembly," Annals of Nuclear Energy, Accepted for Publication (2018)
7. Eun Jeong, **Jiwon Choe**, Peng Zhang, Ho Cheol Shin, Deokjung Lee, "New High Performance Light Water Reactor Core Concept with Mixed Cycle Length Operation", Int. J. Energ. Res., Published Online. <http://dx.doi.org/10.1002/er.3738> (2017)
8. Jinsu Park, Taewoo Tak, T.K. Kim, **Jiwon Choe**, Yongjin Jeong and Deokjung Lee, "Design Study of Long-Life Small Modular Sodium-Cooled Fast Reactor," Int. J. Energ. Res., 41 (1):13-148, <http://dx.doi.org/10.1002/er.3609> (2016)
9. Taewoo Tak, **Jiwon Choe**, Yongjin Jeong, Deokjung Lee, T.K. Kim, Ser Gi Hong, "Feasibility study on ultralong-cycle operation and material performance for compact

liquid metal-cooled fast reactors: A review work,” *Int. J. Energ. Res.*, 39 (14): 1859-1878.
<http://dx.doi.org/10.1002/er.3384> (2015)

International Topical Meetings

1. **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, China, August 24-25 (2017)
2. **Jiwon Choe**, Ho Cheol Shin, Ji-Eun Jeong and Deokjung Lee, “Cutback Sensitivity Test for Boron-Free Small Modular PWR,” *NEFES 2016*, Beijing, China, August 19-22 (2016)
3. **Jiwon Choe**, Ho Cheol Shin, Deokjung Lee, “Optimal Control Rod for Boron-Free Small Modular PWR,” *PBNC 2016*, Beijing, China, April 5-9 (2016)
4. **Jiwon Choe**, Deokjung Lee, and Ho Cheol Shin, “Preliminary Design of Boron-Free Small Modular Pressurized Water Reactor,” *PHYSOR2016*, Sun Valley, ID, USA, May 1-5 (2016)
5. **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)
6. **Jiwon Choe**, Taewoo Tak, Yongjin Jeong, Deokjung Lee, and Taek Kyum Kim, “The Impact of Thorium Blanket On Long-Life Fast Reactor Core Performance Characteristics,” *ANUP 2014*, Jeju Island, Korea, November 9-12 (2014)
7. **Jiwon Choe**, Minyong Park, Sooyoung Choi, Taewoo Tak, and Deokjung Lee, “Upgrade of Mode-K Strategy for Daily Load-Follow Operation of OPR1000,” *ISSNP 2013*, Beijing, November 22-24 (2013)
8. **Jiwon Choe**, Kyeongju Lee, and Deokjung Lee, “Feasibility Study of Load Follow Operation for OPR1000,” *Proc. ICAPP 2013*, Jeju Island, Korea, April 14-18 (2013)
9. Tung Dong Cao Nguyen, **Jiwon Choe**, Bamidele Ebiwonjumi, Matthieu Lemaire, Deokjung Lee, “The Conceptual Core Design of A Small Modular Fast Reactor Cooled by Lead-bismuth Eutectic,” *PHYSOR2018*, Cancun, Mexico, April 22-26 (2018)
10. Sungpil Yum, Ho Cheol Shin, Peng Zhang, **Jiwon Choe**, Deokjung Lee, “Accuracy Improvement of Axial Power Shape Reconstruction of GMDH Algorithm Applying Pattern Recognition Technic,” *PHYSOR2018*, Cancun, Mexico, April 22-26 (2018)
11. Bamidele Ebiwonjumi, Tung Dong Cao Nguyen, **Jiwon Choe**, Deokjung Lee, “MCS Analysis of IAEA Lead-Cooled Fast Reactor Core Neutronics Benchmark,” *PHYSOR2018*, Cancun, Mexico, April 22-26 (2018)
12. Khang Nguyen, **Jiwon Choe**, 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)
13. Chidong Kong, Hyunsuk Lee, Matthieu Lemaire, Wonkyeong Kim, Yunki Jo, Jinsu Park, **Jiwon Choe**, Bamidele Ebiwonjumi, Deokjung Lee, “Introduction to UNIST Spent Nuclear Fuel Transportation Package Analysis Code System,” *RPHA17*, Chengdu, Sichuan, China, August 24-25 (2017)
14. Tung Dong Cao Nguyen, Hyunsuk Lee, **Jiwon Choe**, Ho Cheol Shin, Hwan Soo Lee, Deokjung Lee, “LPPT Analysis of APR1400 Reactor Core by UNIST Monte Carlo Code MCS,” *RPHA17*, Chengdu, Sichuan, China, August 24-25 (2017)
15. Yum Seongpil, Ho Cheol Shin, **Jiwon Choe**, Peng Zhang, Farrokh Khoshahval, Deokjung

- Lee, "Application of GMDH to Cross Section Functionalization," RPHA17, Chengdu, Sichuan, China, August 24-25 (2017)
16. 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)
 17. Jinsu Park, Minyong Park, **Jiwon Choe**, Peng Zhang, Jaerim Jang, Deokjung Lee, "Development Status of Dynamic Reactor Nodal Computational Code RAST-K v2.0," RPHA17, Chengdu, Sichuan, China, August 24-25 (2017)
 18. Sooyoung Choi, **Jiwon Choe**, Jaerim Jang, Deokjung Lee, "Extension of PSM for Ring-type Burnable Absorber Containing Resonant Nuclides," RPHA17, Chengdu, Sichuan, China, August 24-25 (2017)
 19. Hochul Lee, **Jiwon Choe**, Deokjung Lee, Ho Cheol Shin, Hyun Chul Lee, "Verification of SMPWR According to Heavy Reflector Material: Stainless Steel, Zircaloy Using the McCARD," RPHA17, Chengdu, Sichuan, China, August 24-25 (2017)
 20. Jinsu Park, Taewoo Tak, **Jiwon Choe**, Yongjin Jeong, Deokjung Lee, and T. K. Kim, "Long-Life Small Modular Sodium-Cooled Fast Reactor Core Design with Breed-and-Burn Strategy," *PHYSOR2016*, Sun Valley, ID, USA, May 1-5 (2016)
 21. Taewoo Tak, **Jiwon Choe**, Yongjin Jeong, Jinsu Park, Deokjung Lee, and T. K. Kim, "Power Flattening Study of Ultra-Long Cycle Fast Reactor Core," *Thorium Energy Conference 2015 (TheEC15)*, Mumbai, India, October 19-22 (2015)
 22. Jinsu Park, Taewoo Tak, **Jiwon Choe**, Yongjin Jeong, Deokjung Lee, and T. K. Kim, "Comparison of Predicted Breed-and-Burn Evaluation of a Small Modular Sodium-Cooled Fast Reactor with Several Code Systems," *RPHA15*, Jeju, Korea, September 16-18 (2015)
 23. Taewoo Tak, **Jiwon Choe**, Yongjin Jeong, Deokjung Lee, and T. K. Kim, "Study for Requirement of Advanced Long Life Small Modular Fast Reactor," *iNuSTEC2015*, Nilai, Malaysia, August 17-19 (2015)
 24. Ho Cheol Shin, **Jiwon Choe**, Chidong Kong, and Deokjung Lee, "New Burnable Absorber Design with ^{157}Gd and ^{167}Er for PWRs," *ICAPP 2015*, Nice, France, May 03-06 (2015)
 25. Taewoo Tak, **Jiwon Choe**, and Deokjung Lee, "Power Flattening and Breeding Performance Study for UCFR Loading Thorium Fuel," *PBNC2014*, Vancouver, Canada, August 24-29 (2014)

International and Domestic Conferences

1. **Jiwon Choe**, Sooyoung Choi, and Deokjung Lee, "Analysis of Effective Gadolinium Depletion Model," *Transactions of the Korean Nuclear Society Spring Meeting*, Jeju, Korea, May 17-18 (2018)
2. **Jiwon Choe**, Ho Cheol Shin and Deokjung Lee, "Cycle Length Extension of SMPWR Using Zircaloy Reflector," *37th Annual Conference of the Canadian Nuclear Society*, Niagara Falls, ON, Canada, June 4-7 (2017)
3. **Jiwon Choe**, Deokjung Lee, Ji-Eun Jeong, Youqi Zheng, Taewoo Tak, and Ho Cheol Shin, "Axial Region Optimization for Cycle Length Extension of Small Modular PWR," *2016 KNS Spring Meeting*, Jeju Island, Korea, May 12-13 (2016)

4. **Jiwon Choe**, Deokjung Lee, and Ho Cheol Shin, "Performance Evaluation of Alternative Reflector Materials for PWRs," *2015 ANS Annual Meeting*, San Antonio, TX, June 7-11 (2015)
5. **Jiwon Choe**, Deokjung Lee, and Ho Cheol Shin, "New Ring Type Burnable Absorber for PWRs," *2015 ANS Annual Meeting*, San Antonio, TX, June 7-11 (2015)
6. **Jiwon Choe**, Deokjung Lee, Ho Cheol Shin, "Improvement of PWR performance with Reflector," *2015 KNS Spring Meeting*, Jeju Island, Korea, May 7-8 (2015)
7. **Jiwon Choe**, Chidong Kong, Deokjung Lee, and Ho Cheol Shin, "Burnable Absorbers with Enriched Er-167 in PWR Fuel Assembly," *KNS Fall Meeting*, Pyeongchang, Korea, October 30-31 (2014)
8. **Jiwon Choe**, Minyong Park, Sooyoung Choi, Taewoo Tak, and Deokjung Lee, "Application of Mode-K Strategy to Daily Load-Follow Operation of OPR1000," *Transactions of the American Nuclear Society Winter meeting*, Washington D.C., November 10-14 (2013)
9. Peng Zhang, **Jiwon Choe**, Sooyoung Choi, Deokjung, "Burnup Adaptation Model in STREAM/RASTK Code System," *Transactions of the KNS Spring Meeting*, Jeju, Korea, May 16-18 (2018)
10. Hanjoo Kim, Jinsu Park, **Jiwon Choe**, Jiankai Yu, "Multi-physics Coupled Reactor Core Analysis System of RAST-K2.0 with CTF and FRAPCON," Jeju, Korea, May 16-18 (2018)
11. Vutheam Dos, Hyunsuk Lee, **Jiwon Choe**, Ho Cheol Shin, Hwan Soo Lee, Deokjung Lee, "Validation of UNIST MCS Monte Carlo Code System for OPR-1000", *Transaction of KNS Spring Meeting*, Jeju, Korea, May 16-18 (2018)
12. 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)
13. 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)
14. Tung Dong Cao Nguyen, **Jiwon Choe**, Deokjung Lee, "Assessment of Material Homogenization for Fast Reactor Design Using MCS and MC²/TWODANT/REBUS," *KNS Fall Meeting*, Gyeongju, Korea, October 25-27 (2017)
15. Farrokh Khoshahval, Minyong Park, Jinsu Park, **Jiwon Choe**, Peng Zhang, Ho Cheol Shin, Ji Eun Jung, Hwan Soo Lee and Deokjung Lee, "Self Powered Neutron Detectors Calculations Using RAST-K 2.1," *37th Annual Conference of the Canadian Nuclear Society*, Niagara Falls, ON, Canada, June 4-7 (2017)
16. Eun Jeong, **Jiwon Choe**, and Deokjung Lee, Ho Cheol Shin, "Impact of Erbium in Long Cycle Operation of PWR," *KNS Fall Meeting*, Gyeongju, Korea, October 26-28 (2016)
17. Minyong Park, Deokjung Lee, **Jiwon Choe**, and Peng Zhang, Hocheol Shin and Eunki Lee, Youqi Zheng, "Development Status of Diffusion Code RAST-K 2.0 at UNIST," *KNS Fall Meeting*, Gyeongju, Korea, October 26-28 (2016)
18. Seongpil Yum, Jaemin Kim, Minyong Park, **Jiwon Choe**, Peng Zhang, and Deokjung Lee, Ho Cheol Shin, "Accuracy Improvement of Axial Power Shape Reconstruction Using

- GMDH Algorithm,” *KNS Fall Meeting*, Gyeongju, Korea, October 26-28 (2016)
19. Sooyoung Choi, **Jiwon Choe**, and Deokjung Lee, “Incorporation of Collision Probability Method in STREAM to Consider Non-uniform Material Composition in Fuel Subregions,” *KNS Fall Meeting*, Gyeongju, Korea, October 26-28 (2016)
 20. Ho Cheol Shin, Eun Jeong, **Jiwon Choe**, and Deokjung Lee, “Impact of UO₂ Enrichment of Fuel Zoning Rods in Long Cycle Operation of PWR” *KNS Fall Meeting*, Gyeongju, Korea, October 26-28 (2016)
 21. Taewoo Tak, Jinsu Park, **Jiwon Choe**, and Deokjung Lee, Thomas. H. Fanning, Tyler Sumner, Guanheng Zhang, and T. K. Kim, “Anticipated Transient without Scram Assessment at EOC of SM-SFR Using SAS4A/SASSYS-1,” *KNS Fall Meeting*, Gyeongju, Korea, October 26-28 (2016)
 22. Sooyoung Choi, Minyong Park, Youqi Zheng, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Kiho Kim, Ho Cheol Shin, and Deokjung Lee, “Development Status of Reactor Physics Code Suite in UNIST,” *Croatian Nuclear Society*, Zadar, Croatia, June 5-8 (2016)
 23. Taewoo Tak, **Jiwon Choe**, Yongjin Jeong, Deokjung Lee and T. K. Kim, Preliminary Study for Conceptual Design of Advanced Long Life Small Modular Fast Reactor, *KNS Spring Meeting*, Jeju, Korea, May 6-8 (2015)
 24. Chidong Kong, **Jiwon Choe**, Deokjung Lee and Ho Cheol Shin, Isotope Separation Effect of Burnable Absorber for Long-cycle Boron-free Reactor Core, *KNS Spring Meeting*, Jeju, Korea, May 6-8 (2015)
 25. Chidong Kong, **Jiwon Choe**, Ho Cheol Shin, and Deokjung Lee, “Impact of Isotope Separation on Burnable Absorber Performance,” *2015 ANS Annual Meeting*, San Antonio, TX, June 7-11 (2015)
 26. Minyong Park, **Jiwon Choe**, Deokjung Lee, and Eunki Lee, “Application of RAST-K to Simulation of OPR1000 Daily Load Follow Operation,” *KNS Fall Meeting*, Pyeongchang, Korea, October 30-31 (2014)
 27. Hyeon-Jun Jeong, **Jiwon Choe**, and Deokjung Lee, “VENUS-2 Benchmark Problem Analysis with HELIOS-1.9,” *KNS Fall Meeting*, Pyeongchang, Korea, October 30-31 (2014)
 28. Taewoo Tak, Chidong Kong, **Jiwon Choe**, and Deokjung Lee, “Reflector Performance Study in Ultra-long Cycle Fast Reactor,” *KNS Fall Meeting*, Gyeongju, October 24-25 (2013)
 29. Taewoo Tak, **Jiwon Choe**, Hyunsuk Lee and Deokjung Lee, “Verification of UCFR-100 Depletion Calculation with Deterministic Method by Comparing with Probabilistic Method,” *Transactions of the American Nuclear Society Winter meeting*, Washington D.C., November 10-14 (2013)
 30. Sooyoung Choi, **Jiwon Choe**, and Deokjung Lee, “On the Fuel Escape Probability Approximation of Equivalence Theory,” *ANS Winter Meeting*, Washington D.C., November 10-14 (2013)
 31. Kyeongju Lee, **Jiwon Choe**, and Deokjung Lee, “Application of Load Follow Operation to Equilibrium Cycle of OPR1000,” *KNS Fall Meeting*, Gyeongju, Korea, October 25-26 (2012)

Patent

1. Deokjung Lee, Nguyen Tung Dong Cao, **Jiwon Choe**, Kiho Kim, Woonghee Lee, “Fast Reactor Core,” KOR Patent application number: 10-2018-0052628, patent pending, May 8 (2018)
2. Deokjung Lee, Eun Jeong, **Jiwon Choe**, Sooyoung Choi, Jinsu Park, Jaerim Jang, Peng Zhang, “Mixed Cycle Length Operation (MCLO) Method and Fuel Assembly Design for Pressurized Water Reactor (PWR) Long Cycle Operation”, KOR Patent application number: 10-2018-0027313, patent pending, March 8 (2018)
3. **Jiwon Choe**, Ji Eun Jeong, and Ho Cheol, “Neutrons Reflector for Pressurized Water Reactor,” KOR Patent application number: 10-2016-0167561, patent pending, December 9 (2016)

Software Copyrights

1. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, XSLINK-Fuel Assembly XS Processing, C-2018-008346, Korea Copyrights Commission (2018)
2. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, MCS-Depletion Calculation, C-2018-008347, Korea Copyrights Commission (2018)
3. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, MCS-Multigroup Transport, C-2018-008345, Korea Copyrights Commission (2018)
4. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, MCS-Photon Transport, C-2018-008350, Korea Copyrights Commission (2018)
5. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, MCS-VHTR calculation, C-2018-008344, Korea Copyrights Commission (2018)
6. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat

- Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, MCS-PWR calculation, C-2018-008348, Korea Copyrights Commission (2018)
7. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, MCS-Time-dependent Simulation, C-2018-008349, Korea Copyrights Commission (2018)
 8. Deokjung Lee, Peng Zhang, Matthieu Lemaire, Jiankai Yu, Sooyoung Choi, Hyunsuk Lee, Chidong Kong, **Jiwon Choe**, Hanjoo Kim, Bamidele Ebiwonjumi, Wonkyeong Kim, Jinsu Park, Yunki Jo, Kiho Kim, Jaerim Jang, Tung Dong Cao Nguyen, Khang Hoang Nhat Nguyen, Woonghee Lee, Tuan Quoc Tran, Yongmin Jo, Sanggeol Jeong, Eun Jeong, Khassenov Azamat, Vutheam Dos, U-SNF, C-2018-008343, Korea Copyrights Commission (2018)