

Youyeon Choi

Ph.D. Candidate

Department of Nuclear Science and Engineering
Massachusetts Institute of Technology

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EDUCATION

Massachusetts Institute of Technology

Cambridge, MA

Ph.D. student in Department of Nuclear Science and Engineering

Sep. 2022 – Present

- Advisor : Prof. Koroush Shirvan
- Current GPA : 5.0 / 5.0

Seoul National University

Seoul, Republic of Korea

Master of Science in Nuclear Engineering

Mar. 2018 – Feb. 2020

- Advisor : Prof. Hyoungh Kyu Cho
- Thesis Title : Establishment and Validation of Reactor Core Simulator for Subchannel Thermal-hydraulic and Neutron Transport Coupled Analysis
- GPA : 4.08 / 4.30

Seoul National University

Seoul, Republic of Korea

Bachelor of Science in Nuclear Engineering

Mar. 2014 – Feb. 2018

- Exchange semester at the University of British Columbia, Vancouver, BC, Canada (Sep. 2016 – Dec. 2016)
- GPA : 3.56 / 4.30

EXPERIENCE

Graduate Research Assistant

Sep. 2022 – Present

Massachusetts Institute of Technology, Department of Nuclear Science and Engineering

Cambridge, MA, USA

- Multi-physics study on SMR core design using metallic helical cruciform fuel

Researcher

Oct. 2020 – June. 2022

Korea Institute of Nuclear Nonproliferation and Control, INSA

Daejeon, Republic of Korea

- Development of Cybersecurity training program (in cooperation with the US DOE/NNSA)
- Operation of domestic public awareness program for nuclear nonproliferation and security
- International cooperation with IAEA and member states' nuclear security training centers

Research Intern

Mar. 2020 – July 2020

Korea Atomic Energy Research Institute, Innovative System and Safety Research Division *Daejeon, Republic of Korea*

- Validation tests for Containment Pressure and Radioactivity Suppression System in SMART
- 3D simulation of direct contact condensation in In-containment Refueling Water Storage Tank using CUPID
- System-scale simulation for a full-height test facility design

RESEARCH PROJECTS

ATF Solutions to Light Water-Cooled SMRs *funded by the Nuclear Energy University Program (NEUP) of the US Department of Energy (Oct. 2022 – Sep. 2025)*

- Simulate the neutron physics and fuel performance of Lightbridge concept for the NuScale SMR
- Provide scoping analysis of promising longer term advanced fuel forms to improve the safety and economics of LWR-SMRs

Extension of CUPID for whole core TH/neutron transport coupled simulation *funded by Korea Hydro & Nuclear Power Corporation and led by Korea Atomic Energy Research Institute (Mar. 2018 – Sep. 2019)*

- Establishment of the subchannel-scale coupled code system using 3D two-phase flow analysis code, CUPID and whole core neutron transport code, nTER
- Validation of the coupled CUPID/nTER against VERA benchmark and BEAVRS

Improvement of subchannel scale two-phase flow analysis capability and development of Multi-Grid solver for the CUPID code funded by Ministry of Science and Technology and led by Seoul National University of Science and Technology (Jan. 2018 – Feb. 2022)

- Improvement of subchannel analysis capability of CUPID
- Validation of subchannel models in CUPID

PUBLICATIONS

Lee Y.H., Park J., **Choi Y.**, Sim K., Lee Y., Cho H.K., “*Coupled simulation for pin-wise reactor core analysis using subchannel analysis code CUPID and fuel performance code GIFT*,” Annals of Nuclear Energy (In Review)

CONFERENCE PRESENTATIONS

Choi Y., Shirvan K., “*Assessment of NuScale Core Design with Helical Cruciform Fuel Rods*,” Proceedings of 2023 International Congress on Advances in Nuclear Power Plants, Gyeongju, April 2023.

Yang J.H., **Choi Y.**, Bae H., Park H.S., “*Preliminary Calculation of Reverse Flow from IRWST in Test Facility for Validation of SMART Long-term Cooling System*,” Transactions of the Korean Society of Mechanical Engineers (Virtual), Dec. 2020.

Choi Y., Cho H.K., Cho J.Y., Bae H., “*Multi-physics Simulation of BEAVRS Benchmark using CUPID/nTER*,” Transactions of the Korean Nuclear Society Spring Meeting (Virtual), July 2020.

Yang J.H., Ahn T.H., **Choi Y.**, Bang Y.G., Bae H., Park H.S., “*Conceptual Validation Tests on Condensation during Natural Circulation using SISTA*,” Transactions of the Korean Nuclear Society Spring Meeting (Virtual), July 2020.

Ahn T.H., Yang J.H., **Choi Y.**, Seo C.J., Bae H., Park H.S., “*Conceptual Validation Tests on Forced Convection Condensation using SISTA*,” Transactions of the Korean Nuclear Society Spring Meeting (Virtual), July 2020.

Choi Y., Cho H.K., Cho J.Y., “*Coupling of CUPID and nTER for Pin-by-Pin Subchannel Thermal-Hydraulics and Neutronics Analysis*,” American Nuclear Society Winter Meeting & Expo, Washington D.C., Nov. 2020.

Choi Y., Cho H.K., Cho J.Y., “*Multi-physics Solution of VERA Core Physics Benchmark using CUPID and nTER*,” Transactions of the Korean Nuclear Society Autumn Meeting, Goyang, Oct. 2019.

Choi Y., Cho H.K., Cho J.Y., “*Preliminary Multi-Physics Analysis of OPR1000 Reactor Core using Coupled CUPID and nTER*,” Transactions of the Korean Nuclear Society Spring Meeting, Jeju, May 2019.

TECHNICAL SKILLS

Languages: FORTRAN, C/C++, Python, MATLAB

Developer Tools: Visual Studio, VS Code (including Linux environment)

Computational tools in nuclear engineering: Serpent, CASMO (reactor physics) / RELAP5, MARS (system TH) / BISON (fuel performance) / MOOSE (multi-physics framework)

Commercial software: STAR-CCM+ (CFD), Abaqus (FEA), Solidworks (CAD)

TEACHING EXPERIENCE

- Teaching Assistant, MIT Reactor Technology Course for Utility Executives (June, 2023)
- Teaching Assistant, MIT Reactor Technology Course for Utility Executives (June, 2024)

HONORS & AWARDS

- 21st Kwanjeong Educational Foundation Overseas Scholarship (Granted in Sep., 2022)
- 18th Exchange Student Scholarship, MIRAE ASSET Park Hyeon Joo Foundation (Granted in July, 2016)

PROFESSIONAL ACTIVITIES

- 15th Modeling, Experimentation, and Validation (MeV) Summer School (Idaho National Lab., 2023)
- 39th Short courses on Multiphase Flow (ETH Zurich, 2024)
- Student Volunteer of 2024 MIT Energy Conference (Boston, 2024)
- MIT American Nuclear Society (ANS) Student Board - Graduate Student Council (GSC) representative (2024-25)