Minseok Kim

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Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ, USA

| betor of Philosophy in Mechanical and Aerospace Engineering Princeton, NJ, U Cumulative GPA: 3.68/4.00 Supervisor: Prof. Egemen Kolemen orea Advanced Institute of Science and Technology (KAIST) 2023.03-2023 octor of Philosophy in Nuclear and Quantum Engineering (drop out) Daejeon, Ko Supervisor: Prof. Young-chul Ghim 2021.03-2023 orea Advanced Institute of Science and Technology (KAIST) 2021.03-2023 aster of Science in Nuclear and Quantum Engineering 2021.03-2023 Cumulative GPA: 4.02/4.30 2021.03-2023 Thesis: Predicting plasma kinetic profiles with the Gaussian process and a neural network in KSTAR based on magnetic and heating information 2015.03-2021 Supervisor: Prof. Young-chul Ghim 2015.03-2021 orea University (KU) 2015.03-2021 achelor of Science in Physics and Bachelor of Engineering in Interdisciplinary Major in Artificial telligence (Double Major) 2015.03-2021 Cumulative GPA: 3.93/4.50, Major GPA: 4.13/4.50 2023.0 I had mandatorily served in the Republic of Korea Army from 2016.09 to 2018.06. Princeton University ESEARCH EXPERIENCE 2023.0 readuate (Ph.D.): 2023.0 • Supervisor: Prof. Egemen Kolemen, Department of Mechanical and Aerospace Engineering Princeton University <t< th=""><th>EDUCATION Princeton University (PU)</th><th>2023.07-present</th></t<> | EDUCATION Princeton University (PU) | 2023.07-present |
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- Conducted the research as a person in charge of the task commissioned by ITER

Predicted kinetic profiles utilizing magnetic and heating information with an artificial neural network

- Inferred kinetic profiles in real-time utilizing magnetic and heating information to prepare for the nuclear fusion power plant, which may have only a few diagnostics, including magnetic probes
- Utilized SVMR and GPR for inference of the kinetic profiles and its gradients
- Corrected magnetic signal drifts with a linear model

• Estimated blob structures in VEST using Gaussian process regression

- Provided support for utilizing Gaussian process regression to Euchan Joung at the Seoul National University (now the Princeton Plasma Physics Laboratory Ph.D. student)
- Inferred blob size from visible fast camera images in VEST with synthetic images
- The research is supported by K-CLOUD nuclear fusion manpower training project funded by Korea Hydro and Nuclear Power Co., Ltd.

Undergraduate:

2019.01-2019.06 KU

- Supervisor: Prof. Jun-Gil Lee, Department of Physics
- Edited typos in mathematical formulas and made figures for the classical mechanics textbook distributed to the department of Physics major course
- Participated renewal of general physics experiments for freshmen

PUBLICATION & PRESENTATION

Publication:

 <u>Minseok Kim</u>, Won-Ha Ko, Sehyun Kwak, Semin Joung, Wonjun Lee, Boseong Kim, Donguk Kim, Jongha Lee, Choongki Sung, Yong-Su Na, and Young-chul Ghim^{**}, "Kinetic profile inference with outlier detection using Support vector machine regression and Gaussian process regression", 2024 *Nucl. Fusion* 64 106052

Poster presentation:

- <u>Minseok Kim</u>, SangKyeun Kim, Azarakhsh Jalalvand, Ricardo Shousha, Alvin Garcia, Max Curie, Jalal Butt and Egemen Kolemen^{**}, "Autonomous detection and control of Sawtooth instability triggering ELM", The 5th International Conference on Data-Driven Plasma Science (ICDDPS-5), August 12 – August 16, 2024.
- Minseok Kim, Ricardo Shousha, Azarakhsh Jalalvand, SangKyeun Kim, Max Curie, Egemen Kolemen^{**}, "Detecting ELM originated by Sawtooth at DIII-D", 2023 American Physical Society Division of Plasma Physics (APS DPP), October 30 – November 03, 2023.
- <u>Minseok Kim</u>, Seongmin Choi, Semin Joung, Hoiyun Jeong, Sunghyun Park, Y.-c Ghim^{**}, "Correction algorithm for signal drifts in KSTAR magnetic probes using Bayesian statistics", 2023 Korea Physics Society (KPS) Spring Meeting, Daejeon Convention Center, Daejeon, Korea, April 19-21, 2023.
- Minseok Kim, Semin Joung, Sunghyun Park, Y.-c Ghim^{**}, "Feasibility studies on software-based approaches to correct magnetic drifts in KSTAR", 20th International Congress on Plasma Physics (ICPP), HICO, Gyeongju, Korea, November 27-December 2, 2022.
- Minseok Kim, Semin Joung, Sunghyun Park, Y.-c Ghim^{**}, "Software-based approaches including the Bayesian statistics to correct magnetic drifts in tokamaks", Korea Physics Society (KPS) 70th Anniversary and 2022 Fall Meeting, BEXCO, Busan, Korea, October 19-21, 2022.
- Minseok Kim, Semin Joung, W.J. Lee, B. Kim, Yong-Su Na, W.H.Ko, J.H. Lee, and Y.-c Ghim^{**}, "Inference of kinetic profiles for KSTAR plasmas using Gaussian process regression", 1st International Fusion and Plasma Conference (iFPC), Haevichi, Jeju, Korea, August 22-26, 2022.
- Minseok Kim, Semin Joung, W.J. Lee, B. Kim, Yong-Su Na, W.H.Ko, J.H. Lee, and Y.-c Ghim^{**}, "Kinetic profile reconstruction for KSTAR plasmas using support vector machine regression and Gaussian process regression", High-Temperature Plasma Diagnostics (HTPD) Conference 2022, Hyatt Regency Rochester, Rochester, NY, USA, May 15-19, 2022.
- 8. <u>Minseok Kim</u>, Semin Joung, W.H. Ko, J.H. Lee, and Y.-c. Ghim^{**}, "Predicting plasma pressure profiles with Gaussian process and a neural network in KSTAR based on magnetic signals", 2021 American Physical Society Division of Plasma Physics (APS DPP), Virtual, November 08-12, 2021.
- Minseok Kim, Semin Joung, W.H. Ko, J.H. Lee, and Y.-c. Ghim^{**}, "Inference of spatially continuous kinetic profiles with Gaussian processes and neural networks in KSTAR", 2021 Korea Physics Society (KPS) Spring Meeting, Virtual, April 21-23, 2021.

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AWARD & HONORS

| Best Poster Award of iFPC, 2022 1 st International Fusion and Plasma Conference Exemplary Warrior Award for 4 th prize in cook training college, Republic of Korea Army | 2022.08 2017.04 |
|--|---|
| SCHOLARSHIP | |
| Jin Tae Young scholarship for excellent academic achievements Department of Physics, Korea University (Covers full tuition fee for 4 semesters) | 2019.03-2020.12 |
| WORK EXPERIENCE | |
| Army cook at the Northern Forefront Headquarters company, 81 st regiment, 28 th division, Republic of Korea Army | 2016.09-2018.06 |
| OTHER EXPERIENCES | |
| International Mini-Workshop on Open Magnetic Systems for Plasma Confinement, <i>Virtual</i> 2021 APCTP Workshop on Frontiers in Plasma and Beam Physics, <i>POSTECH, Pohang, Korea</i> 6 th Korean Nuclear Fusion Winter School, <i>Virtual</i> Particle Physics Winter Camp, <i>Bloomvista, Yang-pyeong, Korea</i> 2019 English-Science-Vision Summer Camp, <i>Sangjin Elementary School, Danyang, Chungbuk, Korea</i> | 2021.08.24-22 2021.08.08-09 2021.01.25-29 2019.12.26-29 2019.07.22-20 |
| • Being a weekly teacher of computer programming for suburban students | |

TECHNICAL & LANGUAGES SKILLS

Computer programs:

- Proficient in **Python**
- Intermediate in MATLAB, C

Language:

- Fluent in English
 - Best TOEFL scores: RC 30, LC 26, SPK 22, WRT 26, Total 104
- Native in Korean