



State-of-the-Art in Code Generative AI for High- Performance Computing

Takahiro Katagiri
Nagoya University

JHPCN Field Workshop

State-of-the-Art in Code Generative AI for High-Performance Computing

December 5th (Fri), 2025, 15:30 - 16:00

Lecture Room, 2F, Information Technology Center, Nagoya University

Workshop Aim

- In recent years, remarkable progress has been made in code generation AI using large language models (LLMs).
- In particular, their application to HPC codes has been rapidly expanding worldwide.
- On the other hand, **research activities in this field within Japan remain relatively limited.**
- This workshop will feature invited talks introducing research in the United States on the **automatic generation of numerical libraries** (such as BLAS) and the **application of generative AI and auto-tuning** to scientific computing codes, thereby contributing to the advancement of interdisciplinary research.

Program (December 5th) - JHPCN Field Workshop (1)



- 10:00-10:05 Opening
- 10:05-11:00 Invited Talk (1)
 - JACC (Julia for Accelerators): An environment for Performance-Portable and Heterogeneous High-Performance Computing
 - **Dr. Keita Teranishi** (Oak Ridge National Laboratory, USA)
- 11:00-11:45 Invited Talk (2)
 - ChatHPC: Building the Foundations for a Productive and Trustworthy AI-Assisted HPC Ecosystem
 - **Dr. Pedro Valero Lara** (Oak Ridge National Laboratory, USA)

Program (December 5th) - JHPCN Field Workshop (2)



- 10:00-10:05 Opening
- 11:45-13:30 Lunch Break
- 13:30-14:30 Invited Talk (3)
 - AI & HPC Synergies: Developments and Opportunities
 - **Dr. Osni Marques** (Lawrence Berkeley National Laboratory, USA)
- 14:30-15:15 Invited Talk (4)
 - SPIRAL: AI for High Performance Code
 - **Prof. Franz Franchetti** (Carnegie Mellon University, USA)

Program (December 5th) - JHPCN Field Workshop (3)



- 15:15-15:30 Break
- 15:30-16:00 Talk
 - HPC-GENIE: A Multi-Agent Code Generation Platform Project Based on Context Engineering
 - **Prof. Takahiro Katagiri** (Nagoya University, JAPAN)
- 16:00-16:20 Talk
 - Automatic Generation of Numerical Codes for GPUs Using LLMs
 - **Prof. Daichi Mukunoki** (Nagoya University, JAPAN)
- 16:20-16:30 Break
- 16:30-16:45 Talk
 - VibeCodeHPC: CLI-based multi-agents system for auto-tuning
 - **Mr. Shun-ichiro Hayashi** (Nagoya University, JAPAN)
- 16:45-17:10 Talk
 - Evaluating Claude Code's Coding and Test Automation for GPU Acceleration of a Legacy Fortran Application: A GeoFEM Case Study
 - **Prof. Tetsuya Hoshino** (Nagoya University, JAPAN)

Program (December 5th) - JHPCN Field Workshop (4)



- 15:15-15:30 Break
- 17:10-17:30 Talk
 - The Project for Advancement of Software Usability in Materials Science (PASUMS) in the Era of Generative AI: Toward AI-Assisted Workflows and New Approaches to Human Resource Development
 - **Dr. Kazuyoshi Yoshimi** (The Institute for Solid State Physics, University of Tokyo, JAPAN)
- 17:30-17:35 Closing

Acknowledgements

- We express our gratitude to:
 - **Professor Chiba**, Director of the JHPCN
 - **All the JHPCN staff members** at the Information Technology Center, the University of Tokyofor their financial support of the workshop.