

Report on the UTM-KU Student-Led Graduate Student Research Exchange Program

Taiga Kadowaki, Haruka Suga, Yoshimichi Hayashi

This report documents the research presentation event, “UTM-KU Student-Led Graduate Student Research Exchange Program,” which was held on September 28, 2026, in a hybrid format at the IMI Auditorium, Ito Campus of Kyushu University (KU) and online via Zoom.

1. Purpose and Background

The primary objectives of this presentation event were as follows:

- Research Exchange Between Graduate Students of KU and UTM

A total of ten graduate students from Kyushu University (KU) and Universiti Teknologi Malaysia (UTM) delivered research presentations and engaged in discussions in English, deepening their academic knowledge through presentations and Q&A sessions.

- Student-Led Organization and Network Building

With support from the Institute of Mathematics for Industry (IMI) at Kyushu University, the student organizers (Taiga Kadowaki, Haruka Suga, and Yoshimichi Hayashi) took the lead in planning and managing the event from preparation to execution. By creating an international exchange platform led by students, the event aimed to enhance organizational skills and foster collaborative relationships among participants.

- Strengthening Sustainable Relationships

The event was initiated as a continuation of interactions established during the KU students’ visit to UTM in the summer of 2026. By organizing and hosting the event from the Japanese side after returning home, the organizers sought to promote the continued development of relationships between students from the two universities.

2. Expected Outcomes

The following outcomes were anticipated from the event:

- Acquisition of Diverse Perspectives and Advancement of Research

Through presentations and discussions on a variety of topics, including fluid models, statistics, and deep learning, participants were expected to gain new insights and approaches relevant to their own research.

- Improvement of International Communication and Management Skills

Presenting and participating in discussions in English was expected to strengthen the participants’ international communication abilities. In addition, the student organizers were expected to gain practical experience in managing an international academic event by leading activities such as

moderation and timekeeping.

- Establishment of Sustainable Networks and Foundations for Collaborative Research

Through discussions during presentations and direct interactions in the Networking Session, strong relationships were expected to be established among students and researchers from KU and UTM. These connections may contribute to future collaborative research projects and the continuation of international exchange programs.

3. Activities and Achievements

3.0 Event Materials

- Poster and digital signage materials displayed at the venue entrance and on campus digital signage systems.
- Event brochure distributed electronically as an attachment to invitation emails and shared with participants.

3.1 Networking Activities

The networking space was used during breaks and after the presentations to facilitate interaction among presenters and participants.

3.2. Program Schedule and Participants

A total of 24 participants, including presenters, attended the event.

13:00 - 13:45: Opening Remarks and Session 1 (3 presentations)

13:45 - 14:00: Break

14:00 - 14:45: Session 2 (3 presentations)

14:45 - 15:00: Break

15:00 - 16:00: Session 3 (4 presentations) and Closing Remarks

16:00 - 16:30: Networking Session and Award Ceremony

3.3. Presenters and Presentation Topics

Session 1

- Taiga Kadowaki (KU):

"Stochastic Growth Modeling of Vascular Plaque Dynamics and Optimization of Catheter-Based Drug Delivery"

- Fatanah Binti Hamzah (UTM):

"Two-Dimensional Dam-Break Debris Flow Model Incorporating Voellmy Rheology, Earth pressure coefficient and Coriolis Parameter"

- Katsunari Fujishima (KU):
"Mathematical Optimization of Study Time Allocation for Japanese University Entrance Examinations"

Session 2

- Yoshimichi Hayashi (KU):
"Application of Bioconvection Model Framework to Vegetation Distribution"
- Ang Chin Xiang (UTM):
"Omega Limiting Set of b-Bistochastic Quadratic Stochastic Operator"
- Go Hashimoto (KU):
"Description of hybrid systems by term rewriting"

Session 3

- Junya Miyake (KU):
"Bayesian Estimation for Variable Selection and Fusion Based on a Nonlocal Prior"
- Nwebonyi James Ugochukwu (KU):
"Optimal Intermittent Hierarchical Control for Multi-Agent Systems (MASS)"
- Aina Nuha binti Che Mahadzir (UTM):
"Explainable Deep Learning Model using Large Language Model for Palm Oil Fresh Fruit Ripeness"
- Haruka Suga (KU):
"A Mathematical Model for the Optimal Treatment Order of Multiple Vascular Stenoses"

3.4. Awards

To recognize outstanding presentations, awards were presented based on evaluations conducted by KU and UTM faculty members attending the event in person.

- Best Research Presentation Award: Junya Miyake (KU)
- Best Presentation Award: Ang Chin Xiang (UTM)

4. Future Prospects

Based on the achievements and lessons learned from this event, the following future directions are proposed.

- Establishment of Regular Exchange Programs

Building on the mutual exchange activities, including the KU students' visit to UTM during the summer and the subsequent presentation event at KU, the program should be developed into a regular research exchange event.

- Development of Collaborative Research Projects

The networks established through presentations and networking activities should be utilized not only to sustain ongoing exchanges but also to initiate concrete collaborative research projects.

- Continuation of the Student-Led Framework

By maintaining the student-led structure and passing organizational responsibilities to future generations of graduate students, opportunities for developing international leadership and event management expertise can be sustained.

5. Conclusion

The UTM-KU Student-Led Graduate Student Research Exchange Program was successfully completed with the support of the Institute of Mathematics for Industry (IMI), Kyushu University. The major achievements of the event are summarized below.

- Successful Implementation and Completion of Presentations

The event was successfully conducted in a hybrid format using the Ito Campus venue and Zoom. Ten students from KU and UTM completed their research presentations in English, attracting a total of 24 participants and generating active discussions across a wide range of research fields.

- Relationship Building Through the Networking Session

A Networking Session was held at the conclusion of the program, allowing students and faculty members from both universities to engage in direct dialogue. This facilitated stronger academic and cultural connections among participants.

The significance of this event lies in its successful continuation of the exchange initiated by the KU students' visit to UTM during the summer of 2026, ensuring that the exchange did not end as a one-time event but continued through an initiative led by the Japanese side. The student-led framework

established through this event, together with the networks formed among participants, has become an important foundation for future sustainable research exchanges and international collaboration

UTM-KU STUDENT-LED GRADUATE STUDENT RESEARCH EXCHANGE PROGRAM

REGISTRATION



MORE INFORMATION
EMAIL: kadowaki.taiga.841@s.kyushu-u.ac.jp

JOIN ONLINE
Open to all

After registering,
you will receive the
Zoom meeting link.

VENUE: IMI AUDITORIUM (W1-D413), ITO CAMPUS, KYUSHU UNIV.
DATE: MONDAY, SEPTEMBER 28, 2026, 13:00 - 16:30 (OPEN 12:30)

PROGRAM

- Taiga Kadowaki : Stochastic Growth Modeling of Vascular Plaque Dynamics and Optimization of Catheter-Based Drug Delivery
- Fatanah Binti Hamzah : Two-Dimensional Dam-Break Debris Flow Model Incorporating Voellmy Rheology, Earth pressure coefficient and Coriolis Parameter
- Katsunari Fujishima : Mathematical Optimization of Study Time Allocation for Japanese University Entrance Examinations
- Yoshimichi Hayashi : Application of Bioconvection Model Framework to Vegetation Distribution
- Ang Chin Xiang: Omega Limiting Set of b-Bistochastic Quadratic Stochastic Operator
- Go Hashimoto : Description of hybrid systems by term rewriting
- Junya Miyake : Bayesian Estimation for Variable Selection and Fusion Based on a Nonlocal Prior
- Nwebonyi James Ugochukwu : Optimal Intermittent Hierarchical Control for Multi-Agent Systems (MASs)
- Aina Nuha binti Che Mahadzir : Explainable Deep Learning Model using Large Language Model for Palm Oil Fresh Fruit Ripeness
- Haruka Suga : A Mathematical Model for the Optimal Treatment Order of Multiple Vascular Stenoses

STUDENT ORGANIZER: TAIGA KADOWAKI, HARUKA SUGA, YOSHIMICHI HAYASHI
SUPPORTED BY IMI, KYUSHU UNIVERSITY, UTM- CIAM, JST NEXUS

[Reference] Brochure

September 28, 2026

UTM-KU Student-Led Graduate Student Research Exchange Program

Kyushu University Student Organizers:
· Taiga Kadowaki
· Haruka Suga
· Yoshimichi Hayashi

Date: Monday, September 28, 2026
Time: 13:00–16:30 (JST)
Venue: IMI Auditorium (W1-D413), Ito Campus, Kyushu University
Supported by IMI Kyushu University, UTM- CIAM, JST NEXUS

Program

13:00-13:15 / Taiga Kadowaki
13:15-13:30 / Fatanah Binti Hamzah
13:30-13:45 / Katsunari Fujishima
13:45-14:00 / Break
14:00-14:15 / Yoshimichi Hayashi
14:15-14:30 / Ang Chin Xiang
14:30-14:45 / Go Hashimoto
14:45-15:00 / Break
15:00-15:15 / Junya Miyake
15:15-15:30 / Nwebonyi James Ugochukwu
15:30-15:45 / Aina Nuha binti Che Mahadzir
15:45-16:00 / Haruka Suga
16:00-16:30 / Networking Session

1

STUDENT PRESENTATION PROFILES

Name
Taiga Kadowaki
Affiliation: Kyushu University
Current Year of Study: Master's Student (M2)
Supervisor: Atsushi Tera

Presentation Title
Stochastic Growth Modeling of Vascular Plaque Dynamics and Optimization of Catheter-Based Drug Delivery

Abstract (max. 50 words)
This study proposes a stochastic growth model to simulate vascular plaque dynamics and optimize targeted drug delivery. By formulating particle advection-diffusion as an absorbing Markov process, we efficiently compute reaching probabilities and derive optimal dosing curves for catheter positioning, drastically reducing the computational costs of traditional fluid dynamics.

Three Key Research Points
1. Vascular plaque
2. Stochastic growth
3. Markov process

Name
Fatanah Binti Hamzah
Affiliation: Universiti Teknologi Malaysia (UTM)
Current Year of Study: Master's student (M2)
Supervisor: Zubairi Binti Ismail

Presentation Title
Two-Dimensional Dam-Break Debris Flow Model Incorporating Voellmy Rheology, Earth pressure coefficient and Coriolis Parameter

Abstract (max. 50 words)
Debris flow is a known natural disaster that takes place in Malaysia over the years. Representing its behaviour through mathematical modelling remains a challenge until this date. This study introduces a two-dimensional depth-averaged debris flow model incorporating Voellmy rheology, earth pressure coefficient and Coriolis effect for hazard assessment simulation.

Three Key Research Points
1. Mathematical Modelling
2. Physical Mechanisms
3. Numerical Method

STUDENT PRESENTATION PROFILES

Name
Katsunari Fujishima
Affiliation: Kyushu University
Current Year of Study: Master's Student (M2)
Supervisor: Atsushi Tera

Presentation Title
Mathematical Optimization of Study Time Allocation for Japanese University Entrance Examinations

Abstract (max. 50 words)
This study develops a mathematical optimization model for study time allocation in Japanese university entrance examinations. Learning and forgetting curves are incorporated to represent academic performance. Numerical optimization identifies effective subject-specific study schedules under time constraints, providing a quantitative framework for improving learning efficiency and examination performance.

Three Key Research Points
1. Mathematical Modeling of Academic Performance
2. Optimization of Study Time Allocation
3. Quantitative Evaluation of Learning Strategies

Name
Yoshimichi Hayashi
Affiliation: Kyushu University
Current Year of Study: Master's Student (M2)
Supervisor: Atsushi Tera

Presentation Title
Application of Bioconvection Model Framework to Vegetation Distribution

Abstract (max. 50 words)
We propose a novel mathematical framework applying bioconvection and partial differential equation (PDE) models to vegetation distribution patterns. Extending previous research on biological cell movement and pattern formation, this joint study with UTM aims to analyze ecological spatial structures, establishing a theoretical foundation for modeling diverse vegetation dynamics.

Three Key Research Points
1. Bioconvection
2. PDE
3. Bifurcation

2

3

STUDENT PRESENTATION PROFILES

Name

Ang Chin Xiang

Affiliation: Universiti Teknologi Malaysia (UTM)

Current Year of Study: Doctoral Student (D2)

Supervisor: Ahmad Fadillah bin Embong



Presentation Title

Omega Limiting Set of b-Bistochastic Quadratic Stochastic Operator

Abstract (max. 50 words)

Quadratic Stochastic Operators (QSOs) is widely used in predicting population genetics. A class of QSO known as b-bistochastic QSO is formed by taking the b-majorization of the operator. This article describes the omega limiting set of the b-bistochastic QSO on any finite dimensional simplex as it is one of the main problems in non linear operator theory.

Three Key Research Points

1. quadratic stochastic operator
2. nonlinear operator
3. doubly stochastic

Name

Go Hashimoto

Affiliation: Kyushu University

Current Year of Study: Doctoral Student (D3)

Supervisor: Daniel Guina



Presentation Title

Description of hybrid systems by term rewriting

Abstract (max. 50 words)

A hybrid system combines continuous changes, such as those in differential equations, with discrete control. Rewriting systems are used to determine whether a target state can be reached using given rewriting rules. Here, we consider the collision problem in hybrid systems using a "second-order" term rewriting system.

Three Key Research Points

1. Term rewriting systems are well-suited for discussing reachability to a system's target state.
2. By introducing operations on binary relations, the behavior of rewriting systems can be described logically.
3. Hybrid system problems can also be handled by using a rewriting system that includes function terms.

4

STUDENT PRESENTATION PROFILES

Name

Junya Miyake

Affiliation: Kyushu University

Current Year of Study: Master's Student (M2)

Supervisor: Shuichi Kawano



Presentation Title

Bayesian Estimation for Variable Selection and Fusion Based on a Nonlocal Prior

Abstract (max. 50 words)

We propose a Bayesian method for simultaneous variable fusion and selection in linear regression. We construct a nonlocal spike-and-slab prior specifically designed for variable fusion to improve model selection within Bayesian model averaging. Theoretical and empirical studies demonstrate the effectiveness of the proposed method.

Three Key Research Points

1. Bayesian Analysis
2. Variable fusion
3. Non-local prior

Name

Nwibonyi Ugochukwu James

Affiliation: Kyushu University

Current Year of Study: Doctoral Student (D1)

Supervisor: Matsue Kaname



Presentation Title

Optimal Intermittent Hierarchical Control for Multi-Agent Systems (MA5s)

Abstract (max. 50 words)

This study develops an intermittent global linear quadratic regulator (LQR) for heterogeneous linear time-varying (LTV) multi-agent systems. Network-structured weights and a scheduled aggregate differential Riccati equation determine the controller, while an ON-OFF signal enforces zero input during inactive intervals. Lyapunov analysis establishes sufficient conditions for exponential stability of the system and consensus.

Three Key Research Points

1. Aggregate LQR controller design
2. Intermittent network-structured control
3. Stability and consensus analysis

5

STUDENT PRESENTATION PROFILES

Name

Aina Nuha binti Che Mahadzir

Affiliation: Universiti Teknologi Malaysia (UTM)

Current Year of Study: Master's Student (M2)

Supervisor: Nurulqifa binti Khamsi



Presentation Title

Explainable Deep Learning Model using Large Language Model for Palm Oil Fresh Fruit Ripeness

Abstract (max. 50 words)

XAI Palm Oil Inspector presents an explainable AI framework for FFB ripeness classification and harvest recommendation per MPOB standards. A YOLOv8m detector with colour-focused augmentation improves detection accuracy over the original dataset. Combined with Qwin2.5-VL and Deepseek R1 reasoning, the pipeline embeds MPOB domain rules to deliver transparent, field-applicable harvest decisions.

Three Key Research Points

1. Explainable AI
2. Object detection
3. FFB Ripeness Grading

Name

Haruka Suga

Affiliation: Kyushu University

Current Year of Study: Master's Student (M2)

Supervisor: Atsushi Tero



Presentation Title

A Mathematical Model for the Optimal Treatment Order of Multiple Vascular Stenoses

Abstract (max. 50 words)

To optimize catheter treatment for multiple vascular stenoses, we incorporated flow rates derived from Navier-Stokes equations into differential models via simplified fitting, reducing computational costs in complex networks. Results showed that leaving a larger stenosis reduces blood flow, thereby shortening total treatment time and determining the optimal catheter intervention sequence.

Three Key Research Points

1. Mathematical modeling
2. Optimal treatment sequence
3. Computational cost reduction

End of Program

Questionnaire

Please take a moment to complete the questionnaire.

Please scan the QR code below to complete the questionnaire.
<https://forms.gle/AkmNKGZUjMph8NqaG4>



6