FY2025 Grant for International Project Research IMI Joint Use Research Program Proposal

2025/01/29

所属・職名 UTM Centre for Industrial and Applied Mathematics (UTM-CIAM) , Universiti Teknologi Malaysia・Research fellow, UTM Centre for Industrial and Applied Mathematics (UTM-CIAM)

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		整理番号	2025b010	
1.研究計画題目	Malaysia - Japan Symposium on Mathematical and Statistical Modelling			
2.新規・継続	New			
3.種別	国際プロジェクト研究			
4.種目	研究集会（Ｉ）			
5.開催方法				
6.研究代表者	氏名	Zaiton Mat Isa		
	所属部局名	UTM Centre for Industrial and Applied Mathematics (UTM-CIAM) , Universiti Teknologi Malaysia	職名	Research fellow, UTM Centre for Industrial and Applied Mathematics (UTM-CIAM)
7.研究実施期間	2025年08月26日～2025年08月26日			
8.キーワード	Mathematical Modelling, Network Modeling, Game Theory, Applied Mathematics, Stochastic Modelling, Decision Analysis & Analytics, Mathematical Optimization, Conjugate Gradient Method, Combinatorial Optimization, Spatial Statistics, Hydrological Statistics			
9.参加者人数	126			

10.本研究で得られた成果の概要

The Malaysia–Japan Symposium on Mathematical and Statistical Modelling brought together 126 participants from academia, government agencies, and industry, joining both onsite and virtually. With strong representation from Malaysia and Japan, the symposium aimed to strengthen engagement among Science, Technology, Engineering and Mathematics (STEM) researchers and foster collaboration that drives innovation in industrial and environmental challenges. The event served as a dynamic platform that advanced discussions and partnerships aligned with the United Nations Sustainable Development Goals (SDGs), notably SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), SDG 11 (Industry, Innovation, and Infrastructure), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals). These goals guided the symposium's focus on promoting mathematical education, enhancing industrial processes, supporting resilient infrastructure, encouraging sustainable practices, and expanding collaborative models across sectors.

The scientific program featured a series of high-impact presentations from both industry experts and academic researchers. Dr. Haifeng Chen of NEC Laboratories America introduced an AI-driven multi-agent simulation framework for carbon emissions modeling, emphasizing AI integration in carbon neutrality strategies. Dr. Nurul Farahain Mohammad of Insulet Malaysia Sdn. Bhd. highlighted the transformative role of advanced data analytics in improving manufacturing efficiency and decision-making. From a mobility perspective, Dr. Hideaki Yokomizo of WILLER, Inc. discussed the application of AI-based Demand Responsive Transit systems as a sustainable solution for mitigating traffic congestion and environmental stress in Malaysia.

Complementing the industry-focused talks, the session showcased cutting-edge academic research. Associate Professor Dr. Zaitul Marlizawati Zainuddin presented genetic algorithm–based optimization for sustainable biomass supply chains. Associate Professor Dr. Atsushi Tero introduced adaptive network theory and shared outcomes of Malaysia–Japan collaborative work. Associate Professor Dr. Shariffah Suhaila Syed Jamaludin provided an advanced statistical framework for climate-related rainfall modelling using functional data analysis and copula methods, while Dr. Zaiton Mat Isa discussed the application of advection–diffusion equations to transport phenomena such as fumigation, heavy metal migration, and aerosol transmission. The symposium concluded with a networking banquet that supported further informal engagement.

The event achieved substantial impact through the Quadruple Helix model by integrating academia, industry, government, and society to stimulate multidisciplinary collaboration. It strengthened cross-border partnerships, initiated new research opportunities, promoted capacity building among early-career researchers, and reinforced mathematics as a foundation for industrial innovation and sustainability. Supported by IMI funding, the symposium has laid the groundwork for expanded Malaysia–Japan cooperation and future joint initiatives that advance global competitiveness and sustainable development.

Malaysia – Japan Symposium on Mathematical and Statistical Modelling
26 August 2025

IMI Auditorium (W1-D-413), West Zone 1,
Ito Campus, Kyushu University, Japan

broadcast live to
UTM HELIxS, Universiti Teknologi Malaysia,
Johor Bahru, Malaysia

Introduction

The symposium brought together 126 participants, both onsite and virtual, representing academia, government agencies, and industry, with attendees from Japan and Malaysia. A central aim of the event was to strengthen engagement between Science, Technology, Engineering and Mathematics (STEM) researchers from across these sectors, fostering collaboration that supports innovation and applied research in industrial and environmental challenges. This symposium provided a dynamic platform to explore, advance discussion and collaborative efforts, aligned with United Nations Sustainable Development Goals (SDGs), particularly:

#SDG4 Quality Education – promotes education in mathematics and practical applications, bridging academia and industry for skill development and inclusive education

#SDG11 Industry, Innovation, and Infrastructure – Uses mathematics to solve industry issues, driving innovation and resilient infrastructure for sustainable growth

#SDG17 Partnerships for the Goals– A model of collaboration among academia, industry, and stakeholders for goal achievement

#SDG 8 Decent work and Economic growth – Math enhanced industry efficiency drives growth and decent job creation

#SDG 13 Climate Action– Uses mathematics to optimize processes, resource use, and sustainability, supporting climate action.

The scientific program featured presentations from both industry and academia.

Innovating Industry through Mathematical Thinking

Dr. Haifeng Chen, Department Head of NEC Laboratories America, presented an AI-driven multi-agent simulation framework for carbon emissions modeling and optimization, highlighting the integration of artificial intelligence techniques with multi-modal prediction and swarm optimization to support carbon neutrality strategies.

Dr. Nurul Farahain Mohammad of Insulet Malaysia Sdn. Bhd. discussed the role of advanced data analytics in modern manufacturing, illustrating how analytics can optimize operations, enhance decision-making, and improve overall efficiency in industrial systems.

Dr. Hideaki Yokomizo of WILLER, Inc. introduced the application of AI-based Demand Responsive Transit (DRT) systems in Malaysia as a strategy to alleviate traffic congestion and environmental pressures associated with heavy reliance on private vehicles.

Mathematical Applications to Global Challenges

Associate Professor Dr. Zaitul Marlizawati Zainuddin of Universiti Teknologi Malaysia presented her research on genetic algorithm–based optimization methods for location-routing problems in sustainable biomass supply chains. These sessions were followed by expert presentations that showcased the breadth of applications of mathematical and statistical modelling.

Associate Professor Dr. Atsushi Tero of Kyushu University introduced common principles and applications of adaptive network theory, including results from collaborative projects with Malaysian researchers.

Associate Professor Dr. Shariffah Suhaila Syed Jamaludin of Universiti Teknologi Malaysia presented a statistical framework for rainfall intensity and climate challenges in Malaysia, using advanced statistical approaches such as functional data analysis and copula models to improve flood risk prediction.

Dr. Zaiton Mat Isa of Universiti Teknologi Malaysia ended the session with a presentation on advection–diffusion equations (ADE) and their applications to transport phenomena, including fumigation, heavy metal migration, and aerosol transmission. The symposium ended with a banquet provided further opportunities for informal exchange and networking among participants.

Achievement and Impact

This symposium demonstrated the strength of the Quadruple Helix model, which integrates government, academia, industry, and society, and applied it effectively across both Malaysia and Japan. Although conducted as a one-day event, the symposium achieved significant outcomes in strengthening international scientific cooperation and fostering multidisciplinary engagement. The event successfully:

- Created a high-impact platform that brought together diverse expertise from mathematics and industry, enabling meaningful exchange of ideas and methods applicable to real-world challenges.
- Strengthened the Malaysia–Japan research ecosystem, facilitating new academic–industry connections and renewing existing partnerships built over years of collaborative work.
- Highlighted real industrial relevance, showcasing how mathematical modelling, AI, and analytics are being deployed in manufacturing, mobility, climate resilience, and environmental management.
- Encouraged capacity building, especially for early-career researchers and postgraduate students, by providing exposure to cutting-edge methodologies and international research perspectives.
- Advanced SDG-aligned research directions, particularly in sustainable industry, climate action, and innovation-driven economic growth.

IMI funding has helped strengthen the Malaysia-Japan collaboration, leading the way for more jointly event in the future. We recommend continued support and funding for such initiatives, ensuring that mathematics remains a fundamental pillar for both education and industry, driving sustainable development and strengthening global competitiveness.

Acknowledgement
This event was supported by FY2025 Joint Usage Research Program of Institute of Mathematics for Industry, Kyushu University, Japan. Grant for International Project Research-Workshop (I) (2025b010)

開催日:2025/08/26〜2025/08/26

Malaysia – Japan Symposium on Mathematical and Statistical Modelling | 2025b010

カテゴリー:イベント　タグ:国際研究 研究集会Ⅰ

開催概要

- **開催方法**:九州大学 伊都キャンパスとZoomミーティングによるハイブリッド開催
- **開催場所**:九州大学 伊都キャンパス ウエスト1号館 D棟 4階 IMIオーディトリアム(W1-D-413)
- **主要言語**:英語
- **共催**:UTM-CIAM,マス・フォア・インダストリ研究所
- **種別・種目**:国際プロジェクト研究-研究集会(Ⅰ)
- **研究計画題目**:Malaysia – Japan Symposium on Mathematical and Statistical Modelling
- **研究代表者**:Zaiton Mat Isa (UTM Centre for Industrial and Applied Mathematics (UTM-CIAM) , Universiti Teknologi Malaysia)
- **研究実施期間**:2025年8月26日(火)
- **公開期間**:2025年8月26日(火)
- **研究計画詳細**:https://joint2.imi.kyushu-u.ac.jp/research_chooses/view/2025b010

プログラム

8月26日(火)

10:00〜10:30　Opening remarks　by the supporting public sectors

Ambassador of Malaysia

MEXT (Ministry of Education, Culture, Sports, Science and Technology) and/or **JST** (Japan Science & Technology Agency)

METI (Ministry of Economy, Trade and Industry)

10:30〜10:50　keynote and welcome speeches

Dr. Kenji Kajiwara, director of IMI, Kyushu university

Dr. Arifah Binti Bahar, director of UTM-CIAM, UTM

10:50〜11:50　Contributed talk by the industrial sectors

Dr. Haifeng Chen　NEC Laboratories America(Department Head, Doctor)(online)

Title : AI-Driven Multi-Agent Simulation for Accurate Carbon Emissions Modeling and Optimization

Abstract:The talk presents the development of a multi-agent simulator designed to model carbon emissions and support global sustainability efforts. The simulator includes three core components: agents, resources, and topology. Advanced AI techniques are also incorporated to enhance the simulator's capabilities, including a multi-modal time series prediction method for accurate energy cost forecasting and a swarm optimization algorithm to identify optimal strategies for achieving carbon neutrality. By integrating AI and simulation, organizations can model carbon emission processes, conduct "what-if" analyses, and develop actionable strategies to reduce emissions and accelerate progress toward carbon neutrality goals.

Dr. Nurul Farahain Mohammad　Insulet Malaysia Sdn. Bhd.(Senior Analytics Engineer,Technologist,Doctor)(online)

Title : From Data to Decisions: The Role of Analytics in Modern Manufacturing

11:50〜13:30　Lunch break

13:30〜14:30　Invited talks

Dr. Hideaki Yokomizo　WILLER, Inc.(Director and Executive Officer, Doctor)

Title : Solving urban traffic issues in Malaysia by AI-based Demand Responsive Transit

Abstract:Urban transportation in Malaysia is overly reliant on private vehicles, resulting in traffic congestion, traffic accidents, and environmental issues. WILLER group is collaborating with public transportation operators such as Rapid KL to provide AI-based DRT (Demand Responsive Transport), developed and operated in Japan, as the last/first mile transportation to MRT/LRT stations, aiming to address these issues. This presentation will introduce this initiative

Dr. Zaitul Marlizawati Zainuddin　UTM

Title : Genetic Algorithm-Based Optimization of Location-Routing Problems for a Sustainable Biomass Supply Chain

Abstract:Addressing location-routing problems (LRP) is crucial for sustainability in the biomass supply chain (BSC). This study applies a Genetic Algorithm (GA) with automated mutation selection and elite child strategies to solve the LRP. The approach promotes sustainable logistics and provides valuable insights for stakeholders.

14:30〜14:50　Break

14:50〜16:20　Expert presentations

Dr. Atsushi Tero　IMI, Kyushu university (Short presentation by student)

Title : Common principles and applications of adaptive　network theory using

Dr. Shariffah Suhaila Syed Jamaludin, UTM (moderated by Nur Syafiqah)

Title : A Statistical Data-Driven Framework for Understanding Rainfall Intensity and Climate Challenges in Malaysia

Abstract:This study examines advanced statistical methods, including distribution fitting, functional data analysis (FDA), and copula models, to enhance understanding and modeling of Malaysia's increasing flood risks driven by extreme rainfall and climate change. It emphasizes the importance of capturing the temporal structure, interdependencies, and boundedness of wet days to improve flood prediction and resilience planning.

Dr. Zaiton Mat Isa, UTM (moderated by Noraini)

Title : Advection-Diffusion Equations (ADE) in Modeling Transport Phenomena

Abstract:This talk explores the versatility of advection-diffusion equations (ADE) in modeling transport phenomena. Applications include fumigation in grain storage, heavy metal migration in soil and indoor disease transmission.

16:20〜16:50　summary

Malaysian side

Japanese side