13th TWSIAM

2025 TWSIAM Annual Meeting

第13屆台灣工業與應用數學會年會

大會手冊

2025/6/7(六)~2025/6/8(日)

主辦單位：台灣工業與應用數學會、國立清華大學數學系

協辦單位：國科會自然處科學推展中心數學組、國立清華大學理學院

目錄

2025 台灣工業與應用數學會年會

2025 TWSIAM Annual Meeting

會議時間：2025 年 6 月 7 日（六）至 2025 年 6 月 8 日（日）
會議地點：國立清華大學旺宏館國際會議廳、綜合三館
主辦單位：台灣工業與應用數學會
承辦單位：國立清華大學數學系
協辦單位：國科會自然處科學推展中心數學組、國立清華大學理學院

學術委員會(依姓氏筆劃排序)

靜宜大學資料科學系	袁淵明教授
國立中興大學應用數學系	陳鵬文教授
國立成功大學數學系	舒宇宸副教授
國立中央大學數學系	黃楓南理事長
國立臺灣師範大學數學系	黃聰明教授
國立臺灣大學土木工程學系	劉立偉助理教授

海報委員會(依姓氏筆劃排序)

國立臺灣師範大學數學系	樂美亨副教授
國立清華大學數學系	黃皓偉教授

承辦單位籌備人員(依姓名筆劃排序)

國立清華大學數學系	王偉成教授
國立清華大學數學系	朱家杰教授
國立清華大學數學系	江金城教授
國立清華大學數學系	黃皓瑋教授
國立清華大學數學系	蔡志強教授
國立清華大學數學系	鄭志豪教授
國立清華大學數學系	戴佳原教授

2025 TWSIAM Annual Meeting 議程表

Day 1: Saturday, June 7, 2025

<table>
<tr><td>時間</td><td colspan="2">活動</td><td>地點</td></tr>
<tr><td>09:00 ~ 09:30</td><td colspan="2">來賓報到、現場註冊、領取資料</td><td>旺宏館
1F 大廳</td></tr>
<tr><td>09:30 ~ 09:50</td><td colspan="2">年會開幕式
介紹來賓、來賓致詞、理事長致詞</td><td rowspan="7">旺宏館
國際會議廳</td></tr>
<tr><td>09:50 ~ 10:40</td><td colspan="2">Keynote Speaker：陳俊賢(Jiun-Shyan Chen)
Chair：陳明志</td></tr>
<tr><td>10:40 ~ 11:00</td><td colspan="2">團體照、茶會</td></tr>
<tr><td>11:00 ~ 11:15</td><td colspan="2">第二屆(113 年度) TWSIAM 會士證書頒發典禮</td></tr>
<tr><td>11:15 ~ 11:45</td><td colspan="2">太空中心介紹</td></tr>
<tr><td>11:45 ~ 12:45</td><td colspan="2">海報論文 1 分鐘快講</td></tr>
<tr><td rowspan="2">12:45 ~ 14:00</td><td colspan="2">海報報論文展示</td><td>綜三館
R118, R119</td></tr>
<tr><td colspan="2">午餐</td><td>綜三館大廳</td></tr>
<tr><td>地點</td><td>綜三館 R101</td><td>綜三館 R201</td><td>綜三館 R203</td></tr>
<tr><td>Sessions</td><td>計算力學
Chair:劉立偉、陳明志</td><td>產業界的數學
Chair:袁淵明、吳重九</td><td>財金數學與工程
Chair:陳亭甫</td></tr>
<tr><td>14:00 ~ 14:25</td><td>張書瑋</td><td rowspan="4">14:00~14:45
奧義創辦人邱銘彰
14:45~15:00
與談人：台積電技術經理吳重九
15:00~15:15 葉彥廷
15:15~15:30 吳芊
15:30~15:45 吳子軍
15:45~16:00 QA</td><td>林士貴</td></tr>
<tr><td>14:25 ~ 14:50</td><td>楊子儀</td><td>陳俊洪</td></tr>
<tr><td>14:50 ~ 15:15</td><td>陳蓉珊</td><td>匡顯吉</td></tr>
<tr><td>15:15 ~ 15:40</td><td>吳清森</td><td></td></tr>
<tr><td>15:40 ~ 16:00</td><td colspan="2">Coffee Break</td><td>綜三館大廳</td></tr>
<tr><td>16:00 ~ 16:50</td><td colspan="2">TWSIAM 會員大會、傳承下屆年會主辦單位</td><td>綜三館 R101</td></tr>
<tr><td>17:40~</td><td colspan="2">晚宴</td><td>清華水漾湖韻中餐廳
（風雲樓 4 樓）</td></tr>
</table>

2025 TWSIAM Annual Meeting 議程表

Day 2: Sunday, June 8, 2025

時間	活動		地點
09:00 ~ 09:30	來賓報到、現場註冊、領取資料		旺宏館 1F 大廳
09:30 ~ 10:20	Keynote Speaker：陳佩君(Trista Chen) Chair：王偉仲		旺宏館 國際會議廳
10:20 ~ 10:50	Coffee Break		綜三館大廳
地點	綜三館 R101	綜三館 R201	綜三館 R203
Sessions	科學計算 Chair:胡馨云	AI 的數學與理論基礎 Chair:舒宇宸	機器學習的最佳化 Chair:陳界山
10:50 ~ 11:15	吳金典	謝孫源	陳柏安
11:15 ~ 11:40	曾昱豪	舒宇宸	劉建良
11:40 ~ 12:05	翁章譯	嚴健彰	陳鵬文
12:05 ~ 12:30	呂秉澤	薛名成	許瑞麟
12:30 ~ 13:30	海報報論文展示		綜三館 R118,R119
	午餐		綜三館大廳
地點	綜三館 R101	綜三館 R201	綜三館 R203
Sessions	AI 與教育 Chair:蔡炎龍	清華應用數學特別論壇 Chair:朱家杰	學生社群分享 Chair:陳人豪
13:30 ~ 13:55	張嘉惠	蔣俊岳	國立中央大學 國立成功大學 國立陽明交通大學 國立清華大學 輔仁大學
13:55 ~ 14:20	曾正男	李威德	
14:20 ~ 14:45	王道維	吳牧恩	
14:45 ~ 15:10	連育仁	黃乙洺	
15:10 ~ 15:30	Coffee Break		綜三館大廳
15:30 ~ 16:00	閉幕及頒獎		綜三館 R101

講 題 列 表

大會演講

陳俊賢 Jiun-Shyan (J.S.) Chen **講座教授**(University of California San Diego)

講題：Recent Advances in Physics-Informed Machine Learning and Data-Driven Computing

Chair: **陳明志教授(國立台灣科技大學機械工程系)**

陳佩君 Trista Chen **博士**(Microsoft)

講題：Beyond Scaling Laws: From "Large Is Beautiful" to Seeing a World in a Grain of Sand

Chair: **王偉仲教授(國立台灣大學數學系)**

領域論壇

計算力學　Organizer：劉立偉(國立臺灣大學土木工程學系)

張書瑋(國立台灣大學土木工程學系)

講題： In silico investigation and machine learning for bioinspired composite design

楊子儀(國立陽明交通大學土木工程學系)

講題：Recent Development for Vehicle Scanning Method

陳蓉珊(成功大學工程科學系)

講題：Metamaterials in Sound／Vibration Applications

吳清森(國立宜蘭大學土木工程學系)

講題：Numerical Modeling of Intrusive Gravity Currents at a River Conuence: from flow kinematics to hydrodynamics

產業界的數學　Organizer：袁淵明(靜宜大學資料科學系)、吳重九(台積電技術經理)

邱銘彰(奧義智慧科技股份有限公司創辦人)

講題：AI 圈內不能說的秘密：從科幻中湧現的智力

吳重九(台積電技術經理)

講題：產品開發量化方法研究暨實務

葉彥廷(金運科技高級工程師)

講題：運用動態系統以量化 V-Model 方法

吳芊(金運科技助理工程師)

講題：Data-Driven **系統工程量化開發方法**

吳子軍(力致科技高級工程師)

講題：產品設計開發品質工程量化案例分享

財金數學與工程　Organizer：陳亭甫(國立中央大學數學系)

林士貴(國立政治大學金融系)

講題：Volatility Decay and Arbitrage in Leveraged ETFs: Evidence from the US and Japan

陳俊洪(國立勤益科技大學企業管理系)

講題：Pricing vulnerable options under cross-asset Markov-modulated jump-diffusion dynamics

匡顯吉(國立彰化師範大學財務金融技術學系)

講題：Good Jump and Bad Jump Risk Matters: Evidence from S&P500 Returns and Options

科學計算　Organizer：胡馨云(東海大學智慧計算暨應用數學系)

吳金典(國立陽明交大應用數學系)

講題：Applications of State Dependent Riccati Control

曾昱豪(國立高雄大學應用數學系)

講題：A discontinuity-cusp capturing neural network for unsteady Stokes interface problems

翁章譯(國立嘉義大學應數系)

講題：The refining estimates of invariant subspaces through projected nonsymmetric algebraic Riccati equations in high dimensionality reduction and image compression

呂秉澤(國立成功大學數學系)

講題：Can Neural ODE learn correctly?

AI 的數學與理論基礎　Organizer：舒宇宸(國立成功大學數學系)

謝孫源(國立成功大學資訊工程學系)

講題：Approximation Algorithms for Data Center Networks Design

舒宇宸(國立成功大學數學系)

講題：Discontinuity Networks: A KAN-Inspired Approach to Approximating Discontinuous Functions

嚴健彰(輔仁大學數學系)

講題：A Representation of Approximation Functions as Convolutional Neural Networks and Probing the Corresponding Extension

薛名成(國立陽明交通大學應用數學系)

講題：A Review of the Progress on the Kolmogorov-Arnold Theorem and Its Connection to KAN Neural Networks

機器學習的最佳化　Organizer：陳界山(國立臺灣師範大學數學系)

陳柏安(國立陽明交通大學資管所)

講題：Learning Dynamics and Convergences in Multiagent Systems

劉建良(國立陽明交通大學工業工程與管理學系)

講題：Beyond Conventional Dispatching Rules: End-to-End Deep Reinforcement Learning for Dynamic Scheduling

陳鵬文(國立中興大學應用數學系)

講題：One-Bit Diffraction Tomography

許瑞麟(國立成功大學數學系)

講題：Last two pieces of puzzle for un-solvability of a system of two quadratic (in)equalities

AI 與教育　Organizer：蔡炎龍(國立政治大學應用數學系)

張嘉惠(國立中央大學資訊工程學系)

講題：Tracing students' learning status through dialogue analysis with EduACT

曾正男(國立政治大學應用數學系)

講題：兩倍數教學兩倍數學習：引入 AI 的教學經驗分享

王道維(國立清華大學物理學系)

講題：清華大學普通物理 AI 助教的實行經驗分享

連育仁(中原大學應用華語系)

講題：打造教育的智慧共學場域：AI 教科書

清華應用數學特別論壇　Organizer：朱家杰(國立清華大學數學系)

蔣俊岳(國立虎尾科技大學)

講題：Some meaningful Hermitian solutions of anti-Riccati matrix equation arising in anti-LQR problem

李威德(台泥資訊股份有限公司)

講題：AI 工程師的跨域實戰之路

吳牧恩(國立臺北科技大學)

講題：我的交易人生－從數學出發，走進資訊與金融的世界

黃乙洺(台灣積體電路製造股份有限公司)

講題：The Hidden Power of Mathematics

大 會 演 講

陳俊賢 Jiun-Shyan (J.S.) Chen 講座教授

Department of Structural Engineering
Department of Mechanical & Aerospace Engineering
University of Californian, San Diego, USA

Fields: computational mechanics, meshfree methods, multiscale materials modeling, machine-learning-enhanced computational mechanics, and physics-informed data-driven computing.

Recent Advances in Physics-Informed Machine Learning and Data-Driven Computing

While many machine learning algorithms have gained popularity in various real-world applications, pure black-box data-driven models require enormous datasets, limiting their applicability to problems with scarce measurable data. This presentation introduces recent advances in physics-informed machine learning approaches based on universal thermodynamics principles, where the internal state variables essential to the physics are inferred automatically from the hidden state of the deep neural network. An extension of this approach is using the machine learning algorithms to enhance the numerical solution of PDEs. In this approach, standard approximation spaces, such as those formed by the finite element or reproducing kernel basis functions, are enriched by the neural network constructed basis functions under a Partition of Unity framework. The proposed neural network enhanced Partition of Unity and the feature-encoded transfer learning form an adaptive approximation framework for solving PDEs. These unique combinations of machine learning techniques and advanced computational methods have expanded the horizon of scientific computing beyond what the conventional computational methods can offer.

陳佩君 Trista Chen 博士

Microsoft Director, AI Research Center
Ph.D. Electrical and Computer Engineering, Carnegie Mellon University

Fields: computer vision, multimodal LLM, and health AI.

Beyond Scaling Laws: From "Large Is Beautiful" to Seeing a World in a Grain of Sand

As multimodal large language models (LLMs) continue to advance, their insatiable appetite for training data and compute has become increasingly unsustainable. This has sparked a wave of innovation focused on improving data and parameter efficiency. Some approaches turn to synthetic data to address data scarcity, while others, such as Microsoft's Phi-4-multimodal, demonstrate how compact small language models (SLMs), using distillation, context compression, and external tools, can achieve strong performance with far fewer resources. Yet these strategies, while promising, may introduce risks of overfitting, brittleness, and model collapse.

To navigate these challenges, we must look beyond brute-force scaling and reimagine AI not as monolithic predictors, but as structured, context-aware, and grounded agents. Insights from disciplines like mathematics, physics, and systems theory-drawing on concepts such as entropy, dynamical systems, and statistical reasoning-provide foundational principles for designing robust, interpretable, and adaptable agentic AI.

Meanwhile, AI is evolving into a collaborative partner in both scientific discovery and real-world productivity. LLMs are increasingly used to generate mathematical conjectures, design algorithms, streamline workflows, support creative processes, and optimize complex systems across domains such as business, healthcare, and education. This growing synergy signals a shift from viewing LLMs as passive tools to recognizing their role as active participants in generating knowledge, insight, and value.

In this talk, we explore a future beyond scaling laws, where intelligence emerges not from scale alone, but from structure, interaction, and contextual grounding. As generative AI becomes interwoven into every aspect of our lives, we may glimpse "heaven in a wild flower," and truly see "a world in a grain of sand."

領 域 論 壇

Chair：劉立偉、陳明志

地點：綜三館 R101

2025 年 6 月 7 日（星期六）		Speaker
14:00 ~ 14:25	In silico investigation and machine learning for bioinspired composite design	張書瑋
14:25 ~ 14:50	Recent Development for Vehicle Scanning Method	楊子儀
14:50 ~ 15:15	Metamaterials in Sound/Vibration Applications	陳蓉珊
15:50 ~ 15:40	Numerical Modeling of Intrusive Gravity Currents at a River Confluence: from flow kinematics to hydrodynamics	吳清森

In silico investigation and machine learning for bioinspired composite design

Shu-Wei Chang[1,2,*], Zheng-Shun Su[1], and Bo-Xue Chen[1]
[1] Department of Civil Engineering, National Taiwan University, Taipei 106319, Taiwan,
[2]Department of Biomedical Engineering, National Taiwan University, Taipei 106319, Taiwan

Abstract

Natural materials have attracted considerable attention due to their intricate and versatile architectures, which often combine lightweight characteristics with high mechanical strength. Biological tissues, in particular, exemplify multi-layered, multifunctional, and lightweight structural designs. For instance, birds have evolved extremely lightweight skeletons to enable flight, characterized by hollow bones reinforced with intersecting struts and truss-like frameworks. Along the longitudinal axis of avian bones, increased cross-sectional and polar moments of inertia enhance resistance to bending and torsion. In this talk, I will present our recent research on the in silico investigation of bioinspired composite materials. Drawing inspiration from the microstructure of bone, we extract two-dimensional structural patterns from CT scan data and analyze their geometric characteristics. We have developed an innovative approach to convert CT images into particle-based models for mechanical characterization. By integrating machine learning techniques, our work seeks to uncover the general relationship between complex geometric patterns and mechanical performance. Our results demonstrate strong predictive capability for mechanical behavior and enable rapid identification of mechanical properties across a range of geometries. This facilitates the exploration of novel material design spaces for advanced engineering applications.

*E-mail: changsw@ntu.edu.tw

Recent Development for Vehicle Scanning Method

Judy P. Yang
Department of Civil Engineering, National Yang Ming Chiao Tung University, Hsinchu 300093, Taiwan

Abstract

Based on the theory of a vehicle-bridge interaction system, the concept of vehicle scanning method firstly appeared in 2004. With the prosperous development of related studies in the theoretical formulation, numerical simulation, and experimental validation, the terminology was formally named as vehicle scanning method in 2019. In the past twenty years, various approaches have been developed, mainly focusing on the health monitoring of bridge structures. In this presentation, several advanced vehicle-bridge interaction models are introduced to enhance the identification of bridge frequencies. Additionally, the subtraction strategy is proposed to reduce the adverse effect from practical aspects. Lastly, some examples related to three-dimensional modelling and experimental validation are discussed. The recent development for vehicle scanning method through different approaches are therefore highlighted.

Metamaterials in Sound/Vibration Applications

Jung-San Chen
Department of Engineering Science, National Cheng Kung University, Tainan, Taiwan

Abstract

Metamaterials exhibiting unusual properties were initially developed in the fields of electromagnetism and optics, and later extended to acoustics and elasticity. Those metamaterials can generate bandgaps through local resonance (LR) mechanism. Based on the concept of local resonance (LR), we developed various LR units, including spring–mass systems, membrane-type structures, and double-spiral systems, which are embedded in the host medium for use in engineering vibration control applications. By altering the geometric parameters of the LR cell, the bandgap characteristics can be readily tuned. The integration of smart materials into metamaterials enables more flexible tuning of bandgap properties without altering the structural geometry. The use of a negative capacitance resonant shunt can shift the bandgap to lower frequencies as well as broaden the gap width. Lightweight membrane-type acoustic metamaterials (MAMs) also can be used for sound isolation. Unlike traditional porous or fibrous materials that perform effectively in the high-frequency regime, MAMs overcome the mass-law limitation and operate effectively at low frequencies. Adjusting the physical properties of MAMs enables tuning of the transmission loss (TL) band. To generate multiple TL peaks, asymmetrically arranged masses were adopted. Helmholtz resonators have also been considered effective alternative noise reduction filters, but their bulky size limits their application in the low-frequency regime. We employed the concept of coiling up space to construct two-dimensional coplanar Helmholtz resonators for absorbing low-frequency sound. With two resonators assembled in parallel, sound absorption band can be effectively broadened.

Numerical Modeling of Intrusive Gravity Currents at a River Confluence: from flow kinematics to hydrodynamics

Ching-Sen Wu, Ching-Yuan Lin
Department of Civil Engineering, National Ilan University,
Yilan, Taiwan

Abstract

Gravity currents, also known as density currents, constitute a ubiquitous phenomenon in hydraulics and geophysics. These flows are primarily driven by hydrostatic pressure gradients resulting from density variations due to differences in temperature, dissolved materials, or suspended particulate matter within fluid bodies. Understanding these flows is crucial for accurate prediction of suspended sediments in rivers and reservoirs, which ultimately governs sediment transport dynamics. In recent years, Taiwan has encountered significant challenges related to siltation in natural environments. To address these problems effectively, it is imperative to comprehend the evolution of flow morphologies and the propagation dynamics of gravity currents. While numerous studies have thoroughly investigated the morphodynamics of individual channels, sinuous submarine channels, and reservoirs, comparatively limited research has focused on fluvial network junctions. The flow characteristics at river confluences exhibit considerable complexity due to turbulent transport mechanisms, which stem from tributary convergence and inflows that generate mutual flow deflections and alterations in bed topography. This study examines how these flow phenomena impact environmental systems, with particular emphasis on high-resolution numerical modeling of gravity currents occurring at river confluences subject to constant inflows. For comprehensive analysis of turbulent transport processes, we implemented three-dimensional depth-resolving models based on the Navier-Stokes equations, incorporating the Boussinesq approximation and large-eddy simulation. Our investigation addresses several key aspects: (1) flow morphologies and kinematics, (2) quantification of mass and momentum fluxes, (3) turbulent transport mechanisms, shear layer development, and baroclinic pressure effects, and (4) evolutionary patterns of vertical flow structures and their dynamic properties.

Chair：袁淵明、吳重九

地點：綜三館 R201

2025 年 6 月 7 日（星期六）		Speaker
14:00 ~ 14:45	AI 圈內不能說的秘密：從科幻中湧現的智力	邱銘彰
14:45 ~ 15:00	產品開發量化方法研究暨實務	吳重九
15:00 ~ 15:15	運用動態系統以量化 V-Model 方法	葉彥廷
15:15 ~ 15:30	Data-Driven 系統工程量化開發方法	吳　芊
15:30 ~ 15:45	產品設計開發品質工程量化案例分享	吳子軍
15:45 ~ 16:00	Q&A	

1. 奧義智慧科技股份有限公司 創辦人暨技術長 邱銘彰

Title: AI 圈內不能說的秘密：從科幻中湧現的智力

Abstract: AI 已經全面滲入我們的日常生活，但對它科幻小說般的神秘機制才剛開始探索。當我們眞正踏上理解神經網路(DNN)之旅，才發現這段路原來充滿了驚奇與挑戰，延續去年 CraftCON 中廣受好評的「AI 圈內不能說的秘密」系列，本次我將從統計熱力學、資訊理論與複雜系統科學的科普視角出發，接續探索 DNN 的三大神秘現象。一起輕鬆、深刻地探討神經網路這個非線性、非平衡系統內部所蘊含的驚人結構，揭開 AI 如何從看似混亂的運算中，逐漸湧現出令人驚艷的智慧表現。

2. 主題：產品開發量化方法研究暨實務(台積電技術經理 吳重九/引言)

-> 本單元由三個子題構成，其目的在探討如何應用數學方法以提升產品開發品質之可行性。其作法爲：將暨有的工業工程或系統工程方法，輔以動態系統研究技術而達到此目的。

子題：

1. 運用動態系統以量化 V-Model 方法 (金運科技高級工程師 葉彥廷)

摘要：一般對於 V-Model 產品開發方法較著重定性的論述，因此難有明確遵循的執行細節。本報告卽闡述動態系統與古典系統二者研究方法異同，並試圖透過 Lorenz System 以驗證其可行性。

2. Data-Driven 系統工程量化開發方法 (金運科技助理工程師 吳芊)

摘要：簡述 STEAM 意涵，並據以提出系統分析應僅由數學層面進行，及如何對次系統展開的執行細節；進而建立嚴謹的 AI Agent 框架而達到產品開發自動化的目的。

3. 產品設計開發品質工程量化案例分享(力致科技高級工程師 吳子軍)

摘要：採高效運算 (High Performance Computing) 機房所需之冷卻系統開發爲例，詳述於 Verification 及 Validation 兩階段如何運用前述方法以提升產品開發品質。

Chair: 陳亭甫

地點：綜三館 R203

2025 年 6 月 7 日（星期六）		Speaker
14:00 ~ 14:25	Volatility Decay and Arbitrage in Leveraged ETFs: Evidence from the US and Japan	林士貴
14:25 ~ 14:50	Pricing vulnerable options under cross-asset Markov-modulated jump-diffusion dynamics	陳俊洪
14:50 ~ 15:15	Good Jump and Bad Jump Risk Matters: Evidence from S&P500 Returns and Options	匡顯吉

Volatility Decay and Arbitrage in Leveraged ETFs: Evidence from the US and Japan

Cheng-To Lin
International College
Renmin University of China

Zong-Wei Yeh
Department of Money and Banking
National Chengchi University

George Yungchih Wang
Faculty of International Liberal Arts
Soka University

Shih-Kuei Lin
Department of Money and Banking
National Chengchi University

Abstract

This study examines the role of volatility decay in leveraged exchange-traded funds (LETFs) and its implications for statistical arbitrage strategies. While existing literature predominantly views volatility decay as a structural weakness that erodes long-term LETF performance, we demonstrate that it can be systematically exploited through beta-neutral arbitrage strategies. Using a comprehensive dataset of US and Japanese LETFs, we assess their tracking performance and document cross-market differences arising from distinct leverage replication mechanisms - futures-based (Japan) vs. total return swaps (US). Our empirical findings reveal that shorting paired bull and bear LETFs with equivalent leverage ratios consistently generates risk-adjusted excess returns, confirming that volatility decay is a persistent and exploitable phenomenon.

Pricing vulnerable options under cross-asset Markov-modulated jump-diffusion dynamics

Yu-Min Lian
Department of Business Administration
Fu Jen Catholic University

Jun-Home Chen
Department of Business Administration
National Chin-Yi University of Technology

Abstract

In this study, the dynamics of the underlying asset price and the counterparty's asset price are governed by a cross-asset Markov-modulated jump-diffusion (MMJD) model that captures the time-inhomogeneity and systematic cojumps. Additionally, the forward interest rate processes are driven by a Markov-modulated Heath–Jarrow–Morton model to depict stochastic volatilities. Under an incomplete-market setting, we apply the Markov-modulated Esscher transform technique to determine a risk-neutral martingale measure. After determining the Markov-modulated Esscher parameters, we obtain an integral expression on the prices of vulnerable European-style Black–Scholes options. The numerical illustrations indicate that the findings are consistent with Klein (1996) and contribute to the extant literature on cojumping impacts on vulnerable option prices.

Good Jump and Bad Jump Risk Matters: Evidence from S&P500 Returns and Options

Hsing-Hua Chang
Department of Money and Banking, National Chengchi University

Hung-Wen Cheng
Department of Data Science, Soochow University

Xian-Ji Kuang
Department of Finance, National Changhua University of Education

Shih-Kuei Lin
Department of Money and Banking, National Chengchi University

Pai-Ta Shih
Department of Finance, National Taiwan University

Abstract

The understanding of the relationship between an asset's expected return and its volatility is pivotal in asset pricing. In this paper, we extend the asymmetric double exponential jump-diffusion model grounded in the affine GARCH fr amework. We propose a model within the affine GARCH setting that uses two exponential distributions to separately model good and bad jump innovations. Furthermore, we deduce a closed-form solution for option pricing within this model structure. Our results suggest that the integration of jump components into the variance process significantly bolsters model estimation performance - the bad jump component markedly outstrips its good counterpart in contribution. In our empirical evaluation, we discern the variance risk premiums attributable to these good and bad jumps through model estimation. A cross-sectional regression reveals that both variance risk premiums serve as priced risk factors. Moreover, a time-series examination underscores the prevailing role of the bad jump variance risk premium in forecasting returns.

Chair：胡馨云

地點：綜三館 R101

2025 年 6 月 8 日（星期日）		Speaker
10:50 ~ 11:15	Applications of State Dependent Riccati Control	吳金典
11:15 ~ 11:40	A discontinuity-cusp capturing neural network for unsteady Stokes interface problems	曾昱豪
11:40 ~ 12:05	The refining estimates of invariant subspaces through projected nonsymmetric algebraic Riccati equations in high dimensionality reduction and image compression	翁章譯
12:05 ~ 12:30	Can Neural ODE learn correctly?	呂秉澤

Applications of State Dependent Riccati Control

Chin-Tien Wu
Department of Applied Mathematics, NYCU

June 07, 2025

In this talk, we shall introduce the state dependent control problems based on solving the Riccati equation (SDRE). State equations with external perturbation and noisy observer are handled by optimal Kalman gain and H^∞-control. Some numerical studies will be presented.

A discontinuity-cusp capturing neural network for unsteady Stokes interface problems

Yu-Hau Tseng
Department of Applied Mathematics
National University of Kaohsiung

This talk first reviews the foundation of a discontinuity- and cusp-capturing physics-informed neural network (PINN) for solving static Stokes interface problems based on the traction balance formulation. The network consists of two fully connected sub-networks (one for the pressure and the other for the velocity vector), and both sub-networks share the same coordinate inputs but use distinct augmented feature inputs derived from a presumed level set function presenting the interface position. This strategy effectively and accurately captures the pressure discontinuities and the cusp-like velocity profile at the interface. In the second part, we consider the unsteady Stokes interface problems mainly driven by the interfacial tension. Here, the augmented feature inputs are time-dependent and varied by a level set function following an advection equation. We conduct numerical experiments for two- and three-dimensional Stokes interface problems, comparing the accuracy of our method with augmented immersed interface methods. We also present the simulation of droplet dynamics under a given initial flow.

The refining estimates of invariant subspaces through projected nonsymmetric algebraic Riccati equations in high dimensionality reduction and image compression

Peter Chang-Yi Weng
National Chiayi University

In the era of big data, real-world data like digital photographs, MRI scans, or speech signals usually has a high dimensionality, we need to reduce the dimensionality adequated in order to save data in the limited storage space and to transmit efficiently. Some common methods of dimensionality reduction such as singular value decomposition, principal component analysis, independent component analysis and autoencoders. However, for high dimensionality data, these methods suffer from heavily computational complexity and memory requirement in practice. Therefore, we provide an efficient and accurate method, which is the numerical solution of the projected nonsymmetric algebaric Riccati equations (pNAREs) arisen in the refinement of estimates of invariant subspaces (REIS). The theoretical contribution of our paper is threefold. Firstly, we introduce how to apply SVD to do image compression and provide some mathematics measurement tools. Secondly, the core of this paper is to adapt REIS and find the first singular values to do image compression, especially for high resolution images. The main idea of REIS is applied to large-scale and real matrices via pNAREs or their associated Sylvester equations through Newton's method. Thirdly, we describe some measurement tools like compression ratio, mean square error, peak signal to noise ratio and structural similarity index to evaluate the performance of the compression factors and the quality of the compressed images. Furthermore, the operation counts and computational complexity are also provided. Finally, we present some numerical experiments about some real world image dataset to show the feasibility of our proposed algorithm.

Can Neural ODE learn correctly?

Bing-Ze Lu* and Yen-Hsi Richard Tsai†
*National Cheng Kung University,
† Oden Institute for Computational Engineering and Sciences,
University of Texas at Austin

In this talk, I will introduce Neural ODEs—a powerful framework that blends traditional numerical methods with deep learning by using them to define loss functions. One of the core applications of this approach is uncovering the underlying dynamics of a system from discrete observational data. For autonomous differential systems of the form $\frac{dx}{dt} = f(x)$, the key idea is to approximate the unknown function $f(x)$ with a trainable neural network. By numerically integrating this system, we can then measure the mismatch between model predictions and observed data at selected time points.

In the first part of my presentation, I'll explore structural aspects of the learned dynamics, with a focus on rotational behavior and emerging patterns. I'll compare one-step and multi-step integration methods, highlighting that while minimizing the loss function often yields promising results, it doesn't always guarantee an accurate representation of the system's true behavior. I'll share our insights and conclude this section by proposing practical criteria for choosing numerical integrators that better preserve the intrinsic structure of the original dynamics.

The second part will examine the influence of noise on model learning. I'll show how different noise levels can distort the inferred dynamics and compare the performance of models trained on noisy versus clean data.

Chair：舒宇宸

地點：綜三館 R201

2025 年 6 月 8 日（星期日）		Speaker
10:50 ~ 11:15	Approximation Algorithms for Data Center Networks Design	謝孫源
11:15 ~ 11:40	Discontinuity Networks: A KAN-Inspired Approach to Approximating Discontinuous Functions	舒宇宸
11:40 ~ 12:05	A Representation of Approximation Functions as Convolutional Neural Networks and Probing the Corresponding Extension	嚴健彰
12:05 ~ 12:30	A Review of the Progress on the Kolmogorov-Arnold Theorem and Its Connection to KAN Neural Networks	薛名成

Approximation Algorithms for Data Center Networks Design

Sun-Yuan Hsieh
Department of Computer Science and Information Engineering,
Institute of Medical Informatics
Institute of Manufacturing Information and Systems
National Cheng Kung University, Taiwan

The network design of the data center has a huge impact on the computing power of large-scale artificial intelligence language models. In this talk we introduce two data center network design issues. Given a metric graph $G = (V, E, w)$, a center $c \in V$, and an integer k, **the Star k-Hub Center Problem** is to find a depth-2 spanning tree T of G rooted by c such that c has exactly k children and the diameter of T is minimized. Those children of c in T are called hubs. A similar problem called the **Single Allocation k-Hub Center Problem** is to find a spanning subgraph H^* of G such that (i) C^* is a clique of size k in H^*; (ii) $V \backslash C^*$ forms an independent set in H^*; (iii) each $v \in V \backslash C^*$is adjacent to exactly one vertex in C^*; and (iv) the diameter $D(H^*)$ is minimized. The vertices selected in C^* are called hubs and the rest of vertices are called non-hubs. Both **Star k-Hub Center Problem** and **Single Allocation k-Hub Center Problem** are NP-hard and have applications in transportation system, telecommunication system, and post mail system. In this talk, we give 5/3-approximation algorithms for both problems. Moreover, we prove that for any $\varepsilon > 0$, the **Star k-Hub Center Problem** has no $(1.5 - \varepsilon)$-approximation algorithm unless P = NP. Under the assumption P $\neq$ NP, for any $\varepsilon > 0$ the **Single Allocation k-Hub Center Problem** has no $(4/3 - \varepsilon)$-approximation algorithm.

Discontinuity Networks: A KAN-Inspired Approach to Approximating Discontinuous Functions

Yu-Chen Shu
Department of Mathematics and Miin Wu School of Computing,
National Cheng Kung University, Taiwan

In this talk, I will discuss the approximation capabilities of Kolmogorov–Arnold Networks (KANs) and Multi-Layer Perceptrons (MLPs). We demonstrate that these two architectures are nearly equivalent in their ability to approximate continuous functions, depending on the choice of activation functions. Leveraging the flexibility of activation function design in KANs, we introduce a novel discontinuity network inspired by the structure of KANs. We will present a convergence analysis of this network and support our findings with corresponding numerical results.

A Representation of Approximation Functions as Convolutional Neural Networks and Probing the Corresponding Extension

Chien-Chang Yen
Mathematics, Fu Jen Catholic University

In this talk, the approach of approximation functions is regarded as convolutional neural networks (CNN). Meanwhile, the hidden layers represents a construction of bases and the functional values appear in the last dense layer. Such CNN representation seems an extension of approximation by generalizing polynomials to be activation functions. Finally, we further probe the behavior of the effectness of this extension using ReLu activation functions.

A Review of the Progress on the Kolmogorov-Arnold Theorem and Its Connection to KAN Neural Networks

Ming-Cheng Shiue
Department of Applied Mathematics,
National Yang Ming Chiao Tung University, Taiwan

The Kolmogorov-Arnold Representation Theorem (KAT) is a foundational result in mathematical analysis that states any multivariate continuous function can be represented as a superposition of continuous univariate functions and a finite number of additions. This theorem has played a crucial role in the development of function approximation theories and has recently gained renewed interest as the theoretical backbone of Kolmogorov-Arnold Networks (KANs). In this talk, I will review the historical development and refinements of the Kolmogorov-Arnold Theorem and present the approximate capability of the KANs.

Chair：陳界山

地點：綜三館 R203

2025 年 6 月 8 日（星期日）		Speaker
10:50 ~ 11:15	Learning Dynamics and Convergences in Multiagent Systems	陳柏安
11:15 ~ 11:40	Beyond Conventional Dispatching Rules: End-to-End Deep Reinforcement Learning for Dynamic Scheduling	劉建良
11:40 ~ 12:05	One-Bit Diffraction Tomography	陳鵬文
12:05 ~ 12:30	Last two pieces of puzzle for un-solvability of a system of two quadratic (in)equalities	許瑞麟

Title: Learning Dynamics and Convergences in Multiagent Systems

Abstract :
From a perspective of designing or engineering for opinion formation games in social networks, the opinion maximization (or minimization) problem has been studied mainly for designing seeding algorithms that aim at selecting a subset of nodes to control their opinions. We first define a two-player zero-sum Stackelberg game of competitive opinion optimization by letting the player under study as the leader minimize the sum of expressed opinions by doing so-called "internal opinion design", knowing that the other adversarial player as the follower is to maximize the same objective by also conducting her own internal opinion design. We furthermore consider multiagent learning, specifically using the Optimistic Gradient Descent Ascent, and analyze its convergence to equilibria with a fast convergence rate in the simultaneous-game version of competitive opinion optimization. In another line of previous work, designing learning dynamics has been considered for linear Arrow-Debreu market equilibria. Since Jain reduced equilibrium computation in linear Arrow-Debreu markets to the equilibrium computation in "bijective" markets, we have designed a partially-distributed alternating algorithm for reaching linear bijective market equilibrium, based on solving the rational convex program formulated by Devanur et al., with a convergence rate that is improvable. Thus, we adapt the Optimistic Gradient Descecnt Ascent for a modified program of Devanur et al. with Lagrange multipliers and show converges to market equilibria with bounds of O(1/T^0.5) on the last-iterate convergence rate, where T is the number of iterations, while yet another very recent related work enjoying its proposed distributed dynamics did not consider convergence rates.

Beyond Conventional Dispatching Rules: End-to-End Deep Reinforcement Learning for Dynamic Scheduling

Chien-Liang Liu
Department of Industrial Engineering and Management
National Yang Ming Chiao Tung University

Dispatching rules like SPT and FIFO have anchored dynamic scheduling for decades, offering fast, easily implemented policies even under real-time disruptions, such as machine breakdowns or last-minute job arrivals. However, these heuristics typically rely on static priority measures and may struggle with more complex interdependencies and multi-objective constraints in modern production lines. This presentation ventures beyond those methods by demonstrating an end-to-end deep reinforcement learning (DRL) framework tailored for dynamic scheduling problems. Specifically, we illustrate how advanced actor–critic algorithms and graph-based neural networks (e.g., graph convolutional or graph attention networks) can unify disjunctive graph models (capturing machine-sharing conflicts) with temporal precedence constraints, thereby producing adaptive scheduling policies directly from data. The result is a system that handles real-time disruptions and optimizes performance metrics like makespan and machine utilization across diverse, fast-evolving shop floors. Empirical comparisons with dispatching rules and metaheuristics show the benefits of this data-driven, end-to-end approach, including robustness, scalability, and superior adaptability to stochastic environments. We conclude by highlighting future avenues for heterogeneous graph neural networks and DRL to further advance the real-world applicability of dynamic scheduling.

Title: ONE-BIT DIFFRACTION TOMOGRAPHY

Abstract:
The compressive sensing (CS) framework is proposed to address the burden of analog-to-digit converters. One-bit CS is the extreme case where only the sign of the measurements are recorded.
A few years ago, we proposed null initializations as one initialization scheme for phase retrieval reconstruction. The null initialization can be regarded as one-bit measurements.
In this talk, we shall present a noise-robust framework for 1-bit diffraction tomography, a novel imaging approach that relies on intensity-only binary measurements obtained through coded apertures.
The proposed reconstruction scheme leverages random matrix theory and shifted inverse power iteration, to effectively recover 3D object structures under high-noise conditions.
Proper preconditioners are employed to improve the convergence speed of the tomographic phase retrieval.

Title: Last two pieces of puzzle for un−solvability of a system of two quadratic (in)equalities

Abstract:

Given two quadratic functions \(f(x) = x^T Ax + 2a^T x + a_0 \) and \(g(x) = x^T Bx + 2b^T x + b_0 ,\) each associated with either the strict inequality (<0); non−strict inequality (≤0); or the equality ($=0$), it is a fundamental question to ask whether or not the joint system has a solution? For homogeneous quadratic systems ($a=b=0,~a_0=b_0=0$), starting from Finsler's lemma in 1936 until Yuan's alternative lemma in 1990, all combinations of the un−solvability for $\{x\in \mathbb{R}^n \colon x^\top Ax \star 0\}\cap \{x\in \mathbb{R}^n
\colon x^\top Bx \# 0\}\subset\{0\},$ where $\star$ and $\#$ can be any of $\{<,\le,=\},$ have been shown to possess either a positive definite or a positive semi−definite matrix pencil of A and $B.$ Extensions to non−homogeneous quadratic systems $\{x\in \mathbb{R}^n \colon f(x) \star 0\}\cap \{x\in \mathbb{R}^n \colon g(x) \# 0\}=\emptyset$ have been done for several cases already. There remains two challenging cases still open: the non−homogeneous Calabi Theorem which determines when
$\{f(x)=0\}\cap\{ g(x)=0\}=\emptyset$; and the non−homogeneous (strict) Finsler lemma to determine whether $\{f(x)\le0\}\cap\{g(x)=0\}=\emptyset.$ The talk provides the answers to both.

Chair：蔡炎龍

地點：綜三館 R101

2025 年 6 月 8 日（星期日）		Speaker
13:30 ~ 13:55	Tracing students' learning status through dialogue analysis with EduACT	張嘉惠
13:55 ~ 14:20	兩倍數教學兩倍數學習：引入 AI 的教學經驗分享	曾正男
14:20 ~ 14:45	清華大學普通物理 AI 助教的實行經驗分享	王道維
14:45 ~ 15:10	打造教育的智慧共學場域：AI 教科書	連育仁

題目：清華大學普通物理 AI 助教的實行經驗分享

講者：王道維教授 (清華大學物理系與人文社會 AI 應用與發展研究中心)

摘要：我們自 112 學年開始(2023 年秋季)引入自行開發的 AI 助教，小 TAI，於本校物理系大一普通物理的課程，目前已經在應用於全清華大學理工科系約 1600 位新生，並開始授權給他校使用。本次將分享小 TAI 的設計理念與這兩年(四個學期)來實際應用的情形，分析學生的使用行為如何影響其學習與成績的表現。若時間許可也將介紹今年將開始更新的版本，如何讓 AI 從單純的對話機器人變成有助於大學生課業的 AI 學習輔助平台。

題目：打造教育的智慧共學場域：AI 教科書

講者：連育仁總經理 (ViewSonic/中原大學應用華語系)

摘要：在 AI 浪潮席捲教育現場的今日，傳統教科書的角色正在被重新定義。本場次將分享教育科技產業如何與出版產業結盟，結合自然語言處理、大數據診斷與生成式 AI 技術，從內容設計、即時回饋、師生互動模式到個別化學習診斷運用 AI 入課。本講次將從「AI 教科書三層設計框架」出發，包含：教科書智慧化、學習個別化、教學互動化，透過實際案例展示數學科 AI 教科書原型，如何回應 108 課綱強調的素養導向教學，同時也回應社群中對「AI 教師助手」與「智慧學習」的期待，期能透過討論和與會者共同創造新世代的教學模式。

Chair：朱家杰

地點：綜三館 R201

2025 年 6 月 8 日（星期日）		Speaker
13:30 ~ 13:55	Some meaningful Hermitian solutions of anti-Riccati matrix equation arising in anti-LQR problem	蔣俊岳
13:55 ~ 14:20	AI 工程師的跨域實戰之路	李威德
14:20 ~ 14:45	我的交易人生－從數學出發，走進資訊與金融的世界	吳牧恩
14:45 ~ 15:10	The Hidden Power of Mathematics	黃乙洺

Some meaningful Hermitian solutions of anti-Riccati matrix equation arising in anti-LQR problem

Chun-Yueh Chiang
Center for Fundamental Sciences,
National Formosa University, Huwei 632, Taiwan.

In this talk, we consider a class of conjugate discrete-time Riccati equations (CDARE), arising originally from the linear quadratic regulation problem for discrete-time antilinear systems. Recently, we have proven the existence of the maximal solution to the CDARE with a nonsingular control weighting matrix within the framework of a constructive method. Our contribution in the work is to find another meaningful Hermitian solution, which has received little attention in this field. Moreover, we show that certain extremal solutions cannot be simultaneously attained, and almost (anti-)stabilizing solutions coincide with some extremal solutions. We expected that our theoretical results presented in this work will play an important role in optimal control problems for discrete-time antilinear systems.

從數學到現場：AI工程師的跨域實戰之路

李威德 (台泥資訊)

「我不是從一開始就懂AI，更不是一開始就知道自己會走到這裡。」

我的專業訓練原本來自數學，長年鑽研科學計算、矩陣分析與數值最佳化。畢業後踏入職場，選擇以研發替代役的身份進入機器人公司，從零開始自學AI與自動化技術，也在那三年間，獨立完成公司所有AI專案，從演算法設計、資料清理，到實際落地部署。替代役結束後，我轉入台泥企業團，接手並發展整個企業團的AI應用，橫跨11種不同的產業場域，包括低碳水泥、鋰電池製造、儲能系統、再生能源建置、航運、貨運與廢棄物回收等。這些看似毫無關聯的領域，都圍繞著一個共通目標：**如何透過AI與數據，爲產業創造更高的效能與更低的碳排。**

這場分享並不聚焦在某個演算法的細節，而是想談談一位數學人如何在現實世界中找到自己的定位與價值。 我會分享：

一 、

1. 數學訓練如何影響我面對問題的方式，以及它在AI領域的底層價值
2. 從理論走進產業現場的心理轉變與挑戰：包括自學、碰壁與協作
3. 幾個眞實的跨域案例：如何應用AI幫助水泥廠降低碳排、預測儲能系統異常，或讓航運決策變得更即時有效
4. 對數學與應用數學背景的學生，一些關於職涯選擇與長期成長的建議

如果你曾經懷疑過「學這些數學有什麼用？」這場分享或許能提供一些不同的答案。它不是標準答案，而是我自己在產業裡摸索出來的路。希望能帶給你一點啓發，也讓你對數學的未來用途，有更多元而務實的想像。

我的交易人生——從數學出發，走進資訊與金融的世界

吳牧恩
資訊與財金管理系
國立台北科技大學

在這場演講中，我將分享自己一路從高中對數學的熱忱、大學進入數學系的迷惘，到碩博士階段專注於密碼學與資訊理論的研究。進入職場後，接觸到金融交易與資金管理，才眞正體會到數學在現實世界中的威力與價值。

然而，當我想再深入學習數學時，卻已經無法像學生時期那樣全心投入，只能靠自學與閱讀，思考如何將數學應用在實務當中。對數學家的崇拜，成了一種遙不可及的敬仰。但也發現，其實許多金融與交易問題，靠簡單紮實的數學基礎就能解決。

更重要的是，數學系的訓練帶來了我一輩子都受用的能力：邏輯思考、獨立判斷、清晰分析。這些能力，無論是在學術、工作，還是人生選擇中，都是最可靠的工具。

The Hidden Power of Mathematics

Yi-Ming Huang
Taiwan Semiconductor Manufacturing Company, Ltd.
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Mathematics is often seen as an abstract discipline, but its impact extends beyond equations and theorems. In this talk, I will share my journey from mathematics, through statistics, to industry, reflecting on how mathematical thinking has shaped my problem-solving skills, decision-making, and career development. While I don't use advanced mathematics daily, the structured way of thinking I developed through my studies remains invaluable. I will also discuss key lessons learned along the way and advise mathematics freshmen and soon-to-be graduates as they prepare for their careers.

Additionally, I will highlight the crucial role of mathematics in machine learning and share concrete examples of how I have applied mathematical concepts to solve real-world problems. No matter where your career takes you, I hope this talk provides valuable insights into how mathematical training can be a powerful and versatile tool—even in unexpected ways.

Chair：陳人豪

地點：綜三館 R203

2025 年 6 月 8 日（星期日）			
編號	單位	指導教授	社群代表
1	NCU（國立中央大學）Student Chapter of SIAM	黃楓南教授	宋怡娟
2	NCKU（國立成功大學） Student Chapter of SIAM	舒宇宸教授	李岳鴻 白育儒
3	NYCU（國立陽明交通大學） Student Chapter of SIAM	薛名成教授 林得勝教授	戴晨洋
4	NTHU 清華大學計算與建模科學所 （深度學習應用於物理問題之研究）	陳人豪教授 李金龍教授	謝尚庭
5	NTHU 清華大學計算與建模科學研究所 （與特雷費森教授同行的數值方法之旅）	呂旻哲教授	
6	FJU 輔仁大學數學系	簡偉恆教授	黃子芹

編號	單位	指導教授	社群代表
1	NCU（國立中央大學）Student Chapter of SIAM	黃楓南教授	宋怡娟<u_p54@ymail.com>

摘要：工業與應用數學學會國立中央大學學生分會(NCU SIAM)的成立宗旨爲推廣數學的跨領域應用，以及協助了解產業與所學知識的結合。延續著先前的傳統，除了會在每個月的固定時間舉辦師生聚會，分享近期所聞與討論公共事務的 SIAM News 分享會，今年的我們加入了更多參訪與跨領域合作的機會與活動。2024 年寒假與中央氣象署(CWA)接洽，有幸參訪全國最大的氣象預報站，在如今 AI 盛行的環境下，我們從中了解了人工智慧如何輔助預報的進行，以及了中央氣象署的各部門的分工運作。另外我們也在因緣際會之下參訪愛群生醫團隊，了解團隊近期在發展的胚胎影像擷取技術，讓 AI 輔助原先由醫師執行的手動擷取，並在節省人力與擷取準確度之間做平衡。
主講人：吳雨潭

編號	單位	指導教授	社群代表
2	NCKU（國立成功大學） Student Chapter of SIAM	舒宇宸教授	李岳鴻 <turtlemilktea@gmail.com> 白育儒 <l16121042@gs.ncku.edu.tw> new

摘要：成大的學生社群，每週會讓學生報告研究進度，台下聽者會適時給出回饋供講者做後續修改；此外在成大也舉辦過幾次研討會，我們會鼓勵學生們去參加並和國外學生交流研究成果。活動的部分，我們和科教中心聯合舉辦了 π day 路跑活動，在 3 月 14 日繞著成大周圍跑一個 π 的路線，跑完還有小點心吃！另外在去年我們邀請台大大氣系的郭鴻基老師與陳柏孚老師來帶學生利用 AI 模擬颱風入侵台灣時的氣象變化，學生甚至可以手動更改初始狀態來觀察不同的颱風對台灣影響如何。未來我們的學生社群討論仍將持續進行；此外我們預計舉辦：
(1) 微積分競賽：讓大學部同學能體驗出題者設計的「有趣」、「奇怪」微積分題目。
(2) e day：規劃在 2027 年 1 月 8 日舉辦的活動，類似於 π day 但應該不會是路跑，而是其他互動型活動。
主講人：白育儒

編號	單位	指導教授	社群代表
3	NYCU（國立陽明交通大學） Student Chapter of SIAM	薛名成教授 林得勝教授	戴晨洋 <dai.chen.yang.1121@gmail.com>

摘要：社群今年度一樣爲大學部學生舉辦了暑期專題活動；而碩班的部分，我們會尋找企業前來演講，以及尋找一些地方進行參訪，期望讓各位同學能夠在課業之餘，有更多的外界資訊與接口；我們也會幫碩班生同學舉辦活動聯絡感情，讓碩一新生更能快速地融入新環境以及了解學校研究的領域。

主講人：戴晨洋

編號	單位	指導教授	社群代表
4	NTHU 清華大學計算與建模科學所（深度學習應用於物理問題之研究）	陳人豪教授 李金龍教授	謝尚庭<st.shie@gmail.com>

摘要：本社群聚焦於深度學習在物理問題上的應用與計算，目前針對兩個主題已進行過幾次的論文研讀，並進入實作階段，第一個主題爲透過物理信息神經網路（Physics-informed Neural Networks, PINN）計算玻色-愛因斯坦凝聚問題 （Bose-Einstein Condensate, BEC）的基態，第二個主題爲如何透過深度神經網路來研究量子糾纏之相關問題。未來，我們計劃進一步深化這些研究領域，並進行企業參訪，同時與專家交流，擴展實際應用的視野。

主講人：郭淯鎧

編號	單位	指導教授	社群代表
5	NTHU 清華大學計算與建模科學研究所（與特雷費森教授同行的數值方法之旅）	呂旻哲教授	

摘要：本社群自成立以來，透過系統性地研讀 Nicholas Trefethen 教授所著《譜方法》（Spectral Methods in MATLAB）一書，深入學習並實作擬譜方法（pseudospectral methods）。目前社群已成功將這些數值技術應用於求解標準擴散方程、交叉擴散（cross-diffusion）方程、多孔介質方程（Porous Medium Equation, PME），以及相場理論中的 Cahn–Hilliard 方程等複雜偏微分方程。此外，本社群近期聚焦於反應擴散系統（reaction-diffusion systems），特別是著名的 Gray–Scott 模型，並與國立清華大學資訊工程系洪仕軒教授團隊進行跨領域合作，利用近年迅速發展的物理信息神經網路（Physics-informed Neural Networks, PINN）和循環神經網路（Recurrent Neural Networks, RNN）方法，期望比較這些前沿深度學習方法與傳統擬譜方法的求解效率及準確性。未來，我們計畫舉辦更多跨領域交流活動及學術成果發表，持續推動數值方法與深度學習於實際科學計算中的創新應用。

主講人： 賴敬丰

編號	單位	指導教授	社群代表
6	FJU 輔仁大學數學系	潘俊杰教授	簡偉恆 <jamie041220@gmail.com>

摘要：「數學與 AI 的相遇」讀書會，數學的學習不僅是爲了通過考試，更是爲了在未來的學術研究和應用中發揮作用。透過舉辦「數學與 AI 的相遇」讀書會，提供一個開放且合作的學習環境，讓學生能夠深入理解數學概念，並認識數學在 AI 的應用，從而激發學生對數學的學習熱情，推動數學知識的廣泛應用與傳播。

主講人：黃子芹

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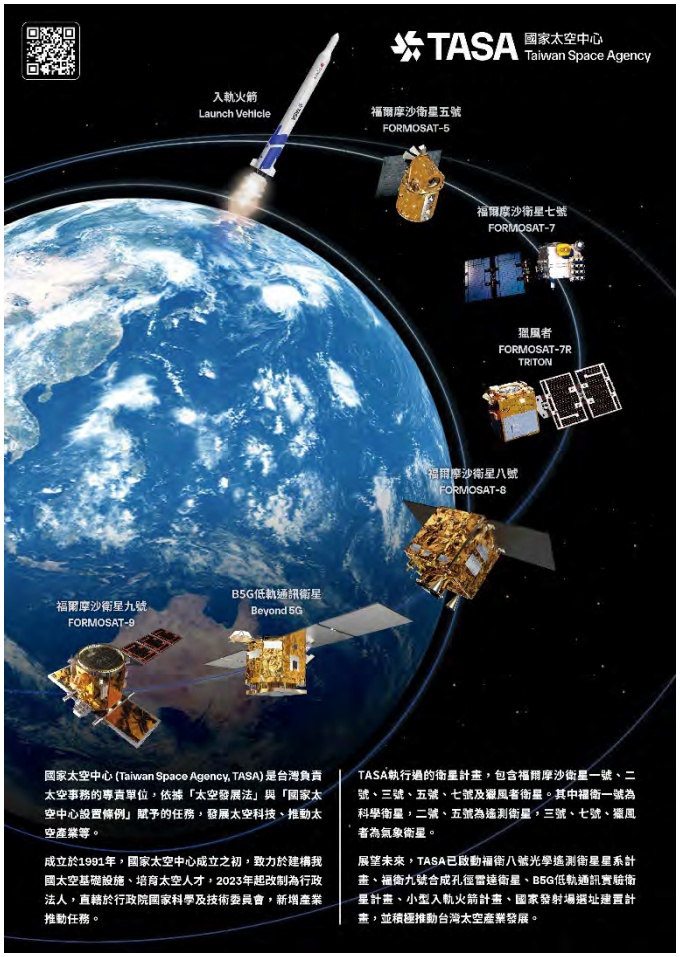
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國家太空中心 (Taiwan Space Agency, TASA) 是台灣負責太空事務的專責單位，依據「太空發展法」與「國家太空中心設置條例」賦予的任務，發展太空科技、推動太空產業等。
成立於1991年，國家太空中心成立之初，致力於建構我國太空基礎設施、培育太空人才，2023年起改制為行政法人，直轄於行政院國家科學及技術委員會，新增產業推動任務。
TASA執行過的衛星計畫，包含福爾摩沙衛星一號、二號、三號、五號、七號及獵風者衛星。其中福衛一號為科學衛星，二號、五號為遙測衛星，三號、七號、獵風者為氣象衛星。
展望未來，TASA已啟動福衛八號光學遙測衛星系計畫、福衛九號合成孔徑雷達衛星、B5G低軌通訊實驗衛星計畫、小型入軌火箭計畫、國家發射場場址建置計畫，並積極推動台灣太空產業發展。


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GitHub 曝險存取
自訂關鍵字：可自訂並管理關鍵字以雜湊情資，自動化 AI 蒐研 GitHub 程式碼洩漏情資。
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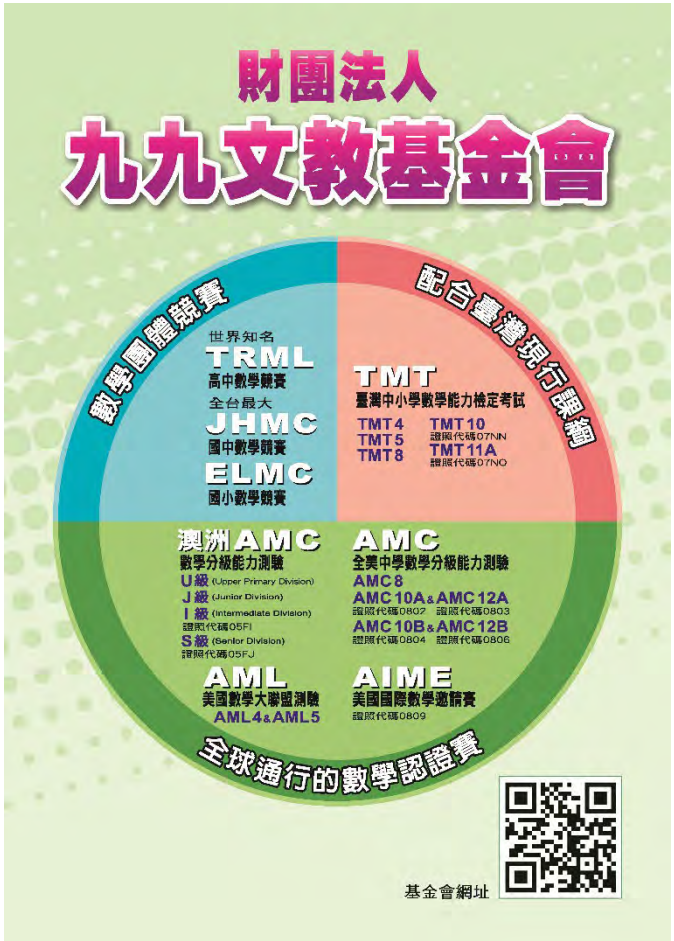
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AMC10B&AMC12B 證照代碼0804 證照代碼0806
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國際會議廳
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182 高鐵站
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