TCMB 2025 Workshop on Applied Mathematics

June 26, 2025

Rm 433, Science Hall, Tamsui, Tamkang University

Invited Speakers:

Tetsuya Ishiwata, Shibaura Institute of Technology, Japan
Ken-Ichi Nakamura, Meiji University, Japan
Takiko Sasaki, Musashino University, Japan

Program:

10:30-11:00 Ishiwata
11:00-11:30 Nakamura
11:30-12:00 Sasaki

12:00-13:00 Lunch Break

13:00-17:00 Free Discussions

Organizer: Jong-Shenq Guo

Sponsored by
Tamkang Center for Mathematical Biology (TCMB), TKU
National Science and Technology Council

Titles and Abstracts

Tetsuya Ishiwata

Title: On the effects of distributed delays on blow-up of solutions to some delay differential equations

Abstract:
It is well known that time delays sometimes cause instability and oscillation in the solutions of differential equations. In this talk, we mainly focus on delay differential equations with distributed delay and discuss the effects of time delay for such instabilities from the viewpoint of a finite time blow-up of the solutions. This is joint work with Y. Ichida and Y. Nakata.

Ken-Ichi Nakamura

Title: “Disunity is strength” -type result in competitive exclusion

Abstract:
We consider a Lotka-Volterra competition-diffusion model with two populations that differ only in dispersal ability. Under strong competition conditions (which is known as the competitive exclusion case), the outcome of the competition is determined by the sign of the speed of a unique bistable traveling wave. However, as mentioned in the review paper of Girardin (2019), identifying the sign is still a challenging mathematical problem. In this talk, we give some results on the sign of the speed of the bistable traveling wave and show that the fast diffuser always has a competitive advantage for a much broader range of parameters in comparison to previously known results.

Takiko Sasaki

Title: Numerical quenching time for rescaling algorithm on nonlinear wave equations

Abstract:
The rescaling algorithm developed by Berger & Kohn (1988) is a numerical method for computing blow-up solutions in scale-invariant nonlinear evolution equations. In this research, we investigate the application of this algorithm to quenching solutions of wave equations. We prove the convergence of the scheme and also provide proof for the convergence of the numerical quenching time.