2026 Optimization Workshop

Department of Mathematics
National Taiwan Normal University

June 2, 2026

Sponsored by

College of Science, National Taiwan Normal University
Department of Mathematics, National Taiwan Normal University
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Organized by

Jein-Shan Chen

Table 1: Schedule on June 2, 2026. Place: M212, Mathematics Department Building

	Speaker	Title	Chair
13:30 | 13:55	Wei-Shih Du	On regulated contractility condition: New results and generalizations in fixed point theory	Yu-Lin Chang
13:55 | 14:20	Pham Duy Khanh	Finite-Difference-Based Methods for Noisy Black-Box Optimization	Yu-Lin Chang
14:20 | 14:45	Ching-Yu Yang	Improved approach for obtaining dual cones and extended construction of convex cones	Yu-Lin Chang
14:45 | 15:05	*Tea Break*		
15:05 | 16:05	Vo Minh Tam	Analysis of Vector Equilibrium Problems with Partial Orders Induced by Certain Classes of Cones	Wei-Shih Du
16:05 | 17:05	Prashant Singh		Wei-Shih Du
17:05 | 17:30	*Free Discussion*		

On regulated contractility condition: New results and generalizations in fixed point theory

Wei-Shih Du

Department of Mathematics,
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Abstract

In this talk, we introduce and study the concept of regulated contractility condition (abbreviated as (RC)-condition) and present some sufficient conditions for the (RC)-condition. Some new fixed point theorems and new simultaneous generalizations of well-known fixed point theorems satisfying the (RC)-condition are established.

Finite-Difference-Based Methods for Noisy Black-Box Optimization

Pham Duy Khanh
University of Education,
Ho Chi Minh City, Vietnam

Abstract

This talk addresses nonconvex derivative-free optimization problems where only function evaluations and where potentially noisy are available. We propose finite-difference-based methods for minimizing differentiable (not necessarily convex) functions with globally Lipschitz continuous gradients. In the noiseless setting, we prove convergence of the gradient sequence to zero and provide global convergence rates of iterates under the Kurdyka–Łojasiewicz property. In the noisy setting, without requiring knowledge of noise levels, the algorithms reach near-stationary points, with explicit bounds on iterations and function evaluations. Numerical experiments demonstrate robustness and efficiency compared with other finite-difference schemes and state-of-the-art derivative-free solvers, while also integrating acceleration techniques from smooth optimization.

Improved approach for obtaining dual cones and extended construction of convex cones

Ching-Yu Yang

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Abstract

In our previous work [1] we proposed two novel mechanisms for generating closed convex cones: one based on systems of inequalities and the other on support functions, together with explicit characterizations of the associated dual and polar cones. Building upon these results, the present talk develops a strengthened and more systematic approach for deriving dual and polar cones from given convex cones. In addition, we establish a significantly extended and unified framework for the construction of convex cones, which broadens the scope of applicability of existing methods and provides greater structural flexibility.

References

[1] C-Y Yang, Y-L Chang, C-C Hu, and J-S Chen, *Novel constructions for closed convex cones through inequalities and support functions*, Journal of Optimization Theory and Applications, vol. 205, no. 3, Article 57, 2025.

Analysis of Vector Equilibrium Problems with Partial Orders Induced by Certain Classes of Cones

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Abstract

This thesis establishes a comprehensive analytical framework for vector equilibrium problems (VEPs) governed by cone-induced partial orders, with particular emphasis on polyhedral cones and p-order cones. The research systematically develops three interconnected directions.

First, new regularized gap functions are constructed, and sharp error bounds are established for VEPs associated with p-order cones on Hadamard manifolds. By explicitly exploiting the nonlinear geometry of the ℓ_p-norm cones, the classical error bound theory for scalar equilibrium problems and variational inequalities is successfully extended to vector settings ordered by these non-polyhedral cones.

Second, continuous-time dynamical approaches are developed for solving VEPs ordered by polyhedral cones, including ordinary differential systems and fractional-order neurodynamic models involving Caputo derivatives. The global convergence of trajectories to the solution sets is rigorously proved. In the fractional framework, Mittag–Leffler stability is established, highlighting the intrinsic advantages of memory-dependent dynamics.

Third, directional Levitin–Polyak well-posedness is generalized from operator-based variational inequalities to the broader bifunction formulation of VEPs. Using directional minimal time functions and cone-geometric analysis, this extension clarifies directional stability and robustness under matrix-induced partial orderings, thereby connecting directional convergence with residual gap function estimates.

Overall, these results deepen the theoretical foundations of cone-ordered equilibrium theory and provide stable analytical tools for the investigation of complex optimization and network equilibrium models.