Hội thảo

Một số vấn đề đương đại của Toán học

Tiểu ban Tối ưu và Tính toán khoa học

Thời gian: thứ Tư ngày 24 tháng 12 năm 2025

Địa điểm: Phòng 508, nhà A6, Viện Toán học

Cơ quan tổ chức: Viện Toán học

Đơn vị tài trợ: Trung tâm Nghiên cứu và Đào tạo Toán học Quốc tế - Viện Toán học

CHƯƠNG TRÌNH

Thứ Tư ngày 24 tháng 12 năm 2025

08:55 – 09:00 **Khai mạc**

Chủ tọa: **Nguyễn Đông Yên**

09:00 – 09:30 **Vũ Ngọc Phát** (Viện Toán học)
Stability and control of fractional differential time-delay equations

09:30 – 10:00 **Lê Dũng Mưu** (Trường Đại học Thăng Long)
Some solution methods for the Nikaidô-Isoda-Fan equilibrium problem

10:00 – 10:20 **Tiệc trà**

10:20 – 10:50 **Trương Xuân Đức Hà** (Trường Đại học Thăng Long)
On the equilibrium prices of a regular locally Lipschitz exchange economy

10:50 – 11:20 **Trần Văn Thắng** (Trường Đại học Điện lực)
A novel proximal-based algorithms for mixed set-valued quasi-variational inequalities

11:20 – 14:00 **Ăn trưa và nghỉ trưa**

Chủ tọa: **Lê Xuân Thanh**

14:00 – 14:30 **Đỗ Đức Thuận** (Đại học Bách khoa Hà Nội)
Some optimization techniques related to exponential stability of positive implicit dynamic equations

14:30 – 15:00 **Nguyễn Thị Hồng** (Viện Toán học)
Stability conditions for a class of nonlinear time varying switched systems with delays and sector type nonlinearities

15:00 – 15:20 **Tiệc trà**

15:20 – 15:50 **Nguyễn Thị Toàn** (Đại học Bách khoa Hà Nội)
Directional generalized differentiation and applications to set-valued optimization, multiobjective optimal control problems

15:50 – 16:20 **Nguyễn Hải Sơn** (Đại học Bách khoa Hà Nội)
Stability of solutions to boundary control problems

TÓM TẮT BÁO CÁO

On the equilibrium prices of a regular locally Lipschitz exchange economy

Trương Xuân Đức Hà*

Abstract: We extend classical results by Debreu and Dierker about equilibrium prices of a regular economy with continuously differentiable demand functions/excess demand function to a regular exchange economy with these functions being locally Lipschitz. Our concept of a regular economy is based on Clarke's concept of regular value and we show that such a regular economy has a finite, odd number of equilibrium prices, the set of economies with infinite number of equilibrium prices has Lebesgue measure zero and there exist locally Lipschitz selections of equilibrium prices around a regular economy.

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Stability conditions for a class of nonlinear time varying switched systems with delays and sector type nonlinearities

Nguyễn Khoa Sơn, Nguyễn Thị Hồng*, Lê Văn Ngọc

Abstract: This talk presents a unified approach to absolute stability analysis for a class of time-varying switched nonlinear systems with delays and sector-type nonlinearities. Several novel sufficient conditions, formulated as linear inequalities, to ensure that the zero solution of the switched systems is both asymptotically and exponentially stable for arbitrary switching signals and any admissible sector-type nonlinearities are provided. For time-invariant positive systems, a necessary and sufficient condition for absolute stability is established. The developed approach utilizes the Lyapunov-Krasovskii function method, the comparison principle and the properties of positive systems. Examples are included to illustrate the effectiveness of the proposed method.

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Some solution methods for the Nikaidô-Isoda-Fan equilibrium problem

Lê Dũng Mưu*

Abstract: In this talk, we briefly present some main solution-methods for solving the equilibrium problem

$$\text{Find } x \in C \text{ such that } f(x,y) \geq 0 \text{ for all } y \in C,$$

where C is a convex set in a real Hilbert space $\mathbb{H}$, and $f : \mathbb{H} \to \mathbb{R} \cup \{+\infty\}$ such that $f(x,y) < +\infty$, $f(x,x) = 0$ for every $x, y \in C$. We focus on fixed-point, extragradient, proximal-regularization, gap-function, and dynamical-system methods for both convex and quasiconvex cases. Several split convex feasibility problems related to this equilibrium problem are also presented.

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Stability and control of fractional differential time-delay equations

Vũ Ngọc Phát*

Abstract: The aim of this talk is to report recent advances on stability analysis of fractional differential systems with delays and applications in control theory. The work includes new results on the topic of our research group: Vu N. Phat, Hoang T. Tuan, Nguyen H. Muoi (Institute of Mathematics, Hanoi); Nguyen T. Thanh (Hanoi University of Science and Technology); Mai V. Thuan (Thai Nguyen University); Nguyen H. Sau (Hanoi University of Industry); P. Niamsup (Chiang Mai University, Thailand); Kai Diethelm (Technische Hochschule Wurzburg-Schweinfurt, Germany); H. Trinh (Deakin University, Australia).

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Stability of solutions to boundary control problems

Nguyễn Hải Sơn*

Abstract: In this talk, we present the local stability of the solution map to parametric boundary control problems governed by semilinear elliptic equations with mixed pointwise constraints. We have established some sufficient conditions under which the solution map is upper semicontinuous, continuous, and local Hölder continuous.

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A novel proximal-based algorithms for mixed set-valued quasi-variational inequalities

Lê Xuân Thanh, Trần Văn Thắng*

Abstract: In this talk, we present a proximal-based iterative algorithm for a class of mixed set-valued quasi-variational inequality problems in Hilbert spaces, covering both monotone and non-monotone settings. The method requires only one proximal operator and one cost operator evaluation per iteration, and incorporates adaptive step sizes together with a relaxed two-step inertial term. Convergence is established in the general framework and several important special cases, with the non-monotone case addressed under a new assumption. Numerical experiments demonstrate the efficiency of the proposed algorithm in comparison with existing approaches.

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Some optimization techniques related exponential stability of positive implicit dynamic equations

Đỗ Đức Thuận*

Abstract: In this talk, the problem of positivity and stability for linear time invariant implicit dynamic equations is presented. By using Farkas' lemma, we provide necessary and sufficient conditions for positivity of these equations. This characterization can be considered as a unification and generalization for some previous results. On the other hand, we study the exponential stability of positive implicit dynamic equations. Previously, this issue was not completely addressed. By using Krein-Rutman theorem, we show that a positive implicit dynamic equation on a time scale is uniformly exponentially stable if and only if the characteristic polynomial of the matrix pair defining the equation has all its coefficients of the same sign. An example of the model of a simple circuit is given to illustrate results.

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Directionally generalized differentiation and applications to set-valued optimization, multiobjective optimal control problems

Nguyễn Thị Toàn*

Abstract: In this talk, we study a set valued mathematical programming problem and a multiobjective discrete-time optimal control problem, via the directionally generalized differentiation. By establishing scalarization formulas for the directional coderivatives of single-valued mappings and sum rules for the directionally subdifferential of Lipschitz continuous functions, we first derive necessary conditions for local minimizers in terms of the directionally Mordukhovich subdifferentials to a mathematical programming problem with the set-valued objective functions. We then use the obtained results to derive necessary optimality conditions for a multiobjective discretetime optimal control problem via the directionally generalized differentiation.

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