

國立中央大學數學系

專題演講

主 講 人：林立岡教授 (國立中央大學機械工程學系)

演講題目：Exact Optimization and Optimal Control

演講茶會：2023年10月12日(星期四) 3:30 p.m. ~ 4:00 p.m.

茶會地點：中央大學鴻經館M306

演講時間：2023年10月12日(星期四) 4:00 p.m. ~ 5:00 p.m.

演講地點：中央大學鴻經館M107



Abstract : On the one hand, Control is at the heart of the Information and Communication Technologies to most application domains [1]. Among various control system designs, the state-dependent Riccati equation (SDRE) scheme for Nonlinear Optimal Control has recently attracted considerable attention, with a variety of guaranteed or promising capabilities as well as many successful real implementations [2]. The up-to-date progress in our research outputs highlights the computationally efficient SDRE controller design, which, notably, realizes the tunable balance between solving time and accuracy in the pointwise Riccati solving. All the advantages are benchmarked against MATLAB® R2023a and validated in terms of field-programmable gate array. On the other hand, Optimization is a subject of great importance, broad significance across numerous fields, and even ubiquity in today's world [3]; but its designs in recent years usually pose challenging nonlinear optimization problems for humans or machines, notably, computational issues that have been expected for enhancement [3]. Therefore, it is being explicitly analyzed via a novel perspective/method and from a bottom-up manner, namely "Exact Optimization" [4] rather than the classical "Numerical Optimization" [5-9]. The two subjects (Control and Optimization) largely interconnect [10], and thus we look forward to further insights by inviting more research endeavors. Up until now, the theoretical findings in our group resonate with and impact on applications to aerospace (guidance, unmanned aerial vehicle), robotics (two-wheeled), circuit, bio-medicine (cancer treatment), and marine (autonomous underwater vehicle); while we are trying to expand the spectrum to other fields such as finance.

Our Lab (me.ncu.edu.tw/en/portfolio-item/lglin/)

We provide both theoretical and practical trainings. More specifically, new lab members may choose to acquire experiences in mathematical analysis, software simulations, and/or hands-on experiments in real-time hardware; while the academia as well as industry manifests a growing interest in multi- and inter-disciplinary backgrounds. All alumni are accepted by NTU\EE, NTHU\EE, NYCU\EE, ASML, Micron, and/or TSMC (R&D position and so on); for example, the latest graduate (2021/9 ~ 2023/7) is admitted to the first three institutes. Last but not least, we are very grateful for all the academic and industrial support, including the ongoing funding from or collaborations with, to name a few, NSTC\Math, NYCU\Math, ITRI\Semiconductor, and NCSIST\Missile-and-Rocket; thus, the lab members enjoy early-career interactions that benefit future career plans.

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