

國立陽明交通大學應用數學系

學術演講公告

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講 題：Fast SDDRE-Based Maneuvering-Target Interception at
Prespecified Orientation

時 間：114 年 3 月 25 日(星期二) 下午 14:00 –15:00

地 點：(光復校區) 科學一館 213 室

Abstract

This talk considers the 3-D guidance law based on target lead angle information and the state-dependent differential Riccati equation (SDDRE) scheme. In an application-oriented manner, it presents theories to significantly improve critical computational performance and thus aims at a fast implementation for impact-angle-constrained interception of agile maneuvering targets. More specifically, regarding the two major computational burdens using SDDRE, we have replaced the burden in numerical applicability checking by a simple, equivalent, and closed-form condition for the entire state space, which is actually the dominant burden as supported by complexity analysis and extensive validations. Notably, the proposed analysis not only complements the early findings of applicability guarantee in literature, but also promotes the efficiency of the proposed philosophy when compared to the classic method, where the latter has caused concerns/reservations due to its feasibility and difficulty. On the other hand, we have largely mitigated the second major burden of SDDRE by—after exhaustive trials—selecting the most efficient Riccati-equation solver until the latest benchmarks. Such evaluations are: 1) in favor of a much-less-known achievement, rather than the common QR-based benchmark and 2) subject to both numerical and hardware experiments including, notably, implementations on microcontrollers and field-programmable gate arrays.

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