國立中山大學應用數學系
學術演講

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講　題：Matrix Riccati Equations

時　間：2023/10/12 (Thursday) 16:10~17:00

地　點：理 SC 4009-0 教室

茶　會：15:30

Abstract

　　The matrix Riccati equation appears in many fields of applied mathematics, engineering, and optimal control theory. In this talk, I will introduce the linear quadratic optimal control problems with differential algebraic equation constraints. To address these problems, we require the stabilizing solution to a matrix Riccati equation. This solution plays a critical role in solving the associated optimal control problem. Structure-preserving doubling algorithms (SDAs) are efficient algorithms for solving Riccati-type matrix equations. However, breakdown may occur in SDA. We introduce Ω-symplectic forms (Ω-SF), consisting of symplectic matrix pairs with a Hermitian parametric matrix Ω. Based on the Ω-SF, we develop modified SDAs, called MSDAs, for solving Riccati-type equations. The MSDA generates a sequence of symplectic matrix pairs in Ω-SF and can prevent breakdown by employing a suitable Hermitian matrix Ω. In addition, we show that the Hermitian matrix Ω in MSDAs can be chosen as a real diagonal matrix that can reduce the computational complexity. Numerical results demonstrate a significant improvement in the accuracy of the convergent solution for MSDA.

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