

## Generalized Sylvester Equations: Unified Parametric Solutions

Guang-Ren Duan



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Provides One Unified Formula That Gives Solutions to Several Types of GSEs

Generalized Sylvester equations (GSEs) are applied in many fields, including applied mathematics, systems and control, and signal processing. **Generalized Sylvester Equations: Unified Parametric Solutions** presents a unified parametric approach for solving various types of GSEs.

In an extremely neat and elegant matrix form, the book provides a single unified parametric solution formula for all the types of GSEs, which further reduces to a specific clear vector form when the parameter matrix F in the equations is a Jordan matrix. Particularly, when the parameter matrix F is diagonal, the reduced vector form becomes extremely simple.

The first chapter introduces several types of GSEs and gives a brief overview of solutions to GSEs. The two subsequent chapters then show the importance of GSEs using four typical control design applications and discuss the *F*?coprimeness of a pair of polynomial matrices. The next several chapters deal with parametric solutions to GSEs. The final two chapters present analytical solutions to normal Sylvester equations (NSEs), including the well?known continuous? and discrete?time Lyapunov equations. An appendix provides the proofs of some theorems.

The book can be used as a reference for graduate and senior undergraduate courses in applied mathematics and control systems analysis and design. It will also be useful to readers interested in research and applications based on Sylvester equations.

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