

# Preface

Decoupling or non-interactive control has attracted considerable research attention since the 1960s when control engineers started to deal with multivariable systems. The pioneers in this domain include Morgan, Wolovich and Wonham, and they have laid down fundamental results under the state space framework from the 60s to the 70s. The solutions were sought also in the input-output setting for output feedback systems mainly from the 80s. The theory and design techniques for decoupling control have now more or less matured for linear time-invariant systems, yet there is no single book which focuses on such an important topic. The present monograph intends to fill this gap by presenting a fairly comprehensive and detailed treatment of decoupling theory and relevant design methods.

The materials included here are largely based on research results of the author and his co-workers on decoupling control under the framework of polynomial, transfer function and frequency response settings over the last ten years, except for a chapter on the state space approach. The geometric approach is elegant, but regrettably it has been excluded from this book due to the disparity in mathematical style from the algebraic approach mainly adopted by the book. But disturbance decoupling problem is addressed as well in the book and the emphasis here is on special or relatively new compensation schemes such as actual and virtual feedforward control and disturbance observers, rather than use of feedback control alone for which many excellent textbooks are now already available. Our table of contents can roughly give the idea of what has been contained in the book while Chapter 1 shows a more detailed chapter by chapter preview of our materials.

For presentation, I have made technical development of the results as self-contained as possible. Background materials have been provided in the beginning chapters before various decoupling problems are solved in the sequel chapters. Only knowledge of basic linear system theory is assumed from readers. Illustrative examples of different degrees of complexity are given to facilitate understanding. Therefore, it is believed that the book can be accessed by graduate students, researchers and practising engineers.

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