

Preface

An integral part of control systems engineering is the development of controller design methods to achieve some prescribed performance criteria. It has been one of the most active research areas in the past decades. A common denominator of these methods is the availability of a mathematical model that is derived from physical laws, practical consideration or identification of real data. Several important issues arise including the quality and nature of the model, the performance criteria and control design approach.

This book provides a guided tour of applied control system design. The starting point is the construction of system models based on real experimental data. These models will be evaluated and tested using standard signals. A wide spectrum of control design methods will be applied to these models. Closed-loop system responses will be obtained and compared. The end result is to provide an experience-based recipe that can serve as check-list for researchers or control designers. In this regard, the book unifies the methods for developing feedback controllers and filters for a wide class of dynamical systems and reports on the recent advances in design methodologies. Throughout the book, the use of MATLAB is the vehicle for all methods of analysis and design.

After an introductory chapter, the book is divided into eight self-contained chapters with each chapter being equipped with illustrative examples, problems and questions. The book will be supplemented by some design problems, appropriate appendices and index.

It is planned while organizing the material that this book would be appropriate for use either as graduate-level textbook in applied mathematics as well as different engineering disciplines (electrical, mechanical, civil, chemical, systems), a good volume for independent study or a reference for practicing engineers, interested readers, researchers and students.

KFUPM, Saudi Arabia
BIT, China

Magdi S. Mahmoud
Yuanqing Xia