

Preface

The purpose of this book is to present, in organized form, a number of “selected topics” in feedback design, for linear and nonlinear systems. The choice of topics reflects a teaching activity held in the past 15 years at the University Sapienza in Rome as well as at various other academic institutions. The focus of the book is on methods for achieving asymptotic stability, and disturbance rejection, in the presence of model uncertainties. Among various possible options to deal with such design problem, the emphasis is on methods that, in one form or another, appeal to the classical “small-gain” principle for robust stability. In this setting, the aim is to offer a presentation as much as possible similar for linear and nonlinear systems. Of course, for pedagogical reason, linear systems are handled first. Even though the focus of the book is multi-input multi-output systems, for pedagogical reasons, single-input single-output nonlinear systems are handled first in some detail. As a result, the book begins with a rather tutorial flavor (Chaps. 2 to 8) and ends with a more monographic nature (Chaps. 9 to 12). A more detailed description of the topics covered in the book can be found in the introductory Chap. 1. The book presumes some familiarity with the theory of linear systems and with a few basic concepts associated with the analysis of the stability of equilibrium in a nonlinear system. For the reader’s convenience, a sketchy summary of the relevant background concepts is offered in the two appendices.

The monographic portion of the book reflects in part my own research activity, conducted in collaboration with Lorenzo Marconi and Laurenty Praly, whose unselfish friendship, competence, and patience is gratefully acknowledged. The topics covered in this book have been taught during the past few years at the University Sapienza in Rome as well as at the EECI Graduate School on Control, in Paris, and at the Institute of Cybersystems and Control of Zhejiang University, in

Hangzhou. Encouragement and support from Francoise Lamnabhi and Hongye Su, respectively, are gratefully acknowledged. In particular, while at Zhejiang University, I have been able to establish a fruitful collaboration with Lei Wang, the outcome of which is reflected in the material presented in Chaps. 10 and 11.

Rome, Italy
May 2016

Alberto Isidori

Lectures in Feedback Design for Multivariable Systems

Isidori, A.

2017, XI, 413 p. 27 illus., 5 illus. in color., Hardcover

ISBN: 978-3-319-42030-1