Chapter 4

Feedback Linearizing Control

MICHAEL A. HENSON
Department of Chemical Engineering
Louisiana State University
Baton Rouge, LA 70803-7303

DALE E. SEBORG
Department of Chemical Engineering
University of California
Santa Barbara, CA 93106-5080

4.1 Introduction

In this chapter, the basic theory of feedback linearization is presented and issues of particular relevance to process control applications are discussed. Two fundamental nonlinear controller design techniques — input-output linearization and state-space linearization — are discussed in detail. The theory also is presented for linear systems to facilitate understanding of the nonlinear results. Extensions are presented for disturbances and multivariable processes. Advanced topics such as dynamic feedback linearization, time delay compensation, constraint handling, robustness, and sampled-data systems are also discussed.

A survey of process control strategies and applications shows that: (1) a variety of nonlinear controller design techniques are based on input-output linearization; (2) few experimental studies of these techniques have been