

For over a quarter of a century, high-gain observers have been used extensively in the design of output feedback control of nonlinear systems. This book presents a clear, unified treatment of the theory of high-gain observers and their use in feedback control. Also provided is a discussion of the separation principle for nonlinear systems; this differs from other separation results in the literature in that recovery of stability as well as performance of state feedback controllers is given.

The author provides a detailed discussion of applications of high-gain observers to adaptive control and regulation problems and recent results on the extended high-gain observers. In addition, the author addresses two challenges that face the implementation of high-gain observers: high dimension and measurement noise. Low-power observers are presented for high-dimensional systems. The effect of measurement noise is characterized and techniques to reduce that effect are presented. The book ends with discussion of digital implementation of the observers.

Readers will find

- comprehensive coverage of the main results on high-gain observers;
- rigorous, self-contained proofs of all results; and
- numerous examples that illustrate and provide motivation for the results.

The book is intended for engineers and applied mathematicians who design or research feedback control systems



Hassan K. Khalil has been at Michigan State University (MSU) since 1978 and is currently University Distinguished Professor of Electrical and Computer Engineering. He has consulted for General Motors and Delco Products and published over 100 papers on singular perturbation methods and nonlinear control. He is the author of *Nonlinear Control* (Pearson 2015), *Nonlinear Systems* (Macmillan, 1992; Prentice Hall, 1996 & 2002) and coauthor of *Singular Perturbation Methods in Control: Analysis and Design* (Academic Press, 1986; SIAM, 1999). Dr. Khalil was named IEEE Fellow in 1989 and IFAC Fellow in 2007. He received the 1989 IEEE-CSS George S. Axelby Outstanding Paper Award, the 2000 AACC Ragazzini Education Award, the 2002 IFAC

Control Engineering Textbook Prize, the 2004 AACC O. Hugo Schuck Best Paper Award, the 2009 AGEF Faculty Mentor of the Year Award, and the 2015 IEEE-CSS Bode Lecture Prize. At MSU he received the 1983 Teacher Scholar Award, the 1994 Withrow Distinguished Scholar Award, and the 1995 Distinguished Faculty Award. He was named University Distinguished Professor in 2003. He served as Associate Editor of *IEEE Transactions on Automatic Control*, *Automatica*, and *Neural Networks*, and as Editor of *Automatica* for nonlinear systems and control. He was the Registration Chair of the 1984 CDC, Finance Chair of the 1987 ACC, Program Chair of the 1988 ACC, and General Chair of the 1994 ACC.

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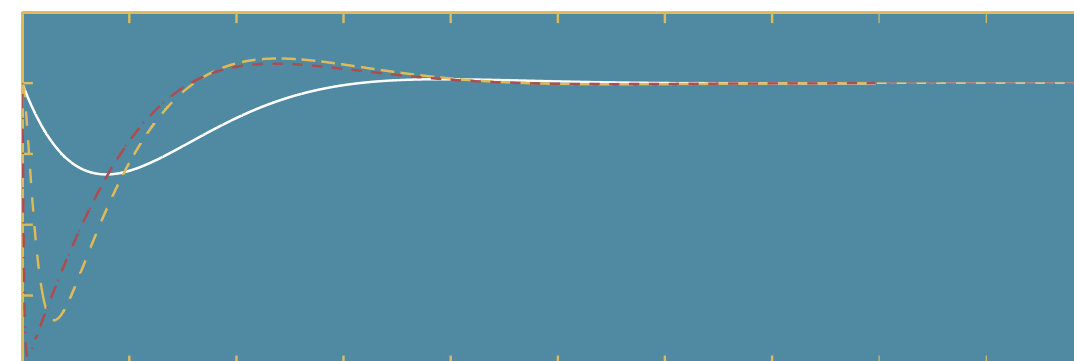
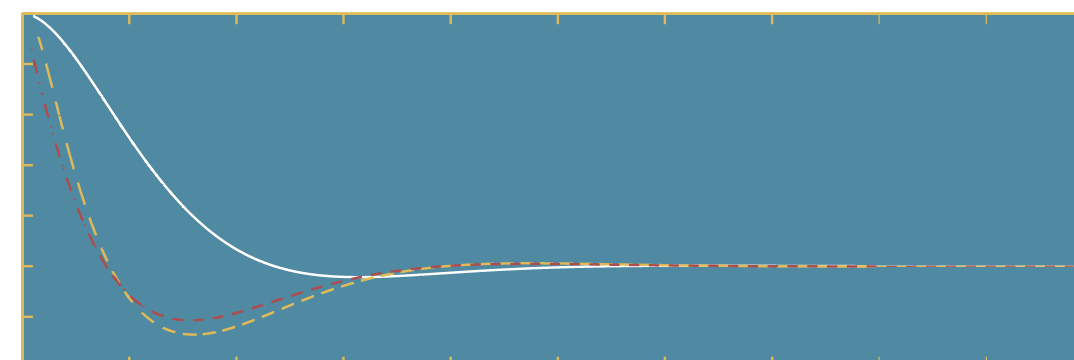
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