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Switching in systems and control.

Systems and Control: Foundations and Applications. Boston, MA: Birkhäuser (ISBN 0-8176-4297-8/hbk). xi, 233 p. EUR 94.00 sFr. 138.00 (2003).

In this book under review systems involving a coupling between continuous dynamics and discrete events are considered. Instead of specific hybrid systems a more general category of systems is investigated from a control-theoretic perspective. Here such systems are called switched systems.

The book is divided into four parts. In the first part classes of hybrid and switched systems are described and illustrated by examples. The second part deals with stability of switched systems. Uniform stability concepts and the Lyapunov function approach are considered. A discussion of the Lie algebraic stability criteria is presented. Systems with special structure are described. Stability under state-dependent switching and stabilization by state-dependent switching is investigated.

The third part is devoted to switching control. A typical configuration of systems consists of a continuous-time plant, a family of controllers and a decision maker which yields a switching signal. Switching control algorithms are presented for several specific problems such as stabilization of nonholonomic systems, control with limited information and switching adaptive control of uncertain systems.

In the last part of the book supplementary material is delivered. A review of Lyapunov's stability theory and basic properties of Lie algebras are presented. The book is closed with a note and reference section and a large list of literature. As the author remarks, the book can be used for an advanced graduate course, or it can serve as an introduction to the main research issues and results on switched systems and switching control for research in various areas of control theory.

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