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| Autore | Fribourg Laurent |
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| Nota di contenuto | Cover; Title Page; Contents; Preface; Acknowledgments; Introduction; Chapter 1. Control Theory: Basic Concepts; 1.1. Model of control systems; 1.2. Digital control systems; 1.2.1. Digitization; 1.2.2. Quantization; 1.2.3. Switching; 1.3. Control of switched systems using invariant sets; 1.3.1. Controlled invariants; 1.3.2. Safety control problem; 1.3.3. Stability control problem; 1.3.4. Other controllers; 1.4. Notes; Chapter 2. Sampled Switched Systems; 2.1. Model; 2.2. Illustrative examples; 2.3. Zonotopes; 2.4. Notes; Chapter 3. Safety Controllers 3.1. Backward fixed point computation (direct approach)3.2. Approximate bisimulation (indirect approach); 3.3. Application to a three-cell Boost DC-DC converter; 3.3.1. Model; 3.3.2. Direct method; 3.3.3. Indirect method; 3.4. Notes; Chapter 4. Stability Controllers; 4.1. Motivation; 4.2. Preliminaries; 4.2.1. Control induced by the decomposition; 4.3. Decomposition function; 4.3.1. Basic procedure; 4.3.2. Enhancement for safety; 4.4. Limit cycles; 4.4.1. Discussion of the assumptions H1 and H2; 4.4.2. Illustrative examples; 4.5. Implementation; 4.6. Notes Chapter 5. Application to Multilevel Converters5.1. Multilevel |

converters; 5.2. Application of the decomposition procedure; 5.2.1. Five-level converter; 5.2.2. Seven-level converter; 5.3. Physical experimentations; 5.4. Notes; Chapter 6. Other Issues: Reachability, Sensitivity, Robustness and Nonlinearity; 6.1. Reachability control; 6.2. Sensitivity; 6.3. Robust safety control; 6.4. Nonlinearity; 6.5. Notes; Conclusions and Perspectives; Appendix 1. Sufficient Condition of Decomposition; Appendix 2. Applications of the Enhanced Decomposition Procedure; Appendix 3. Proof of Theorem 4.3

Sommario/riassunto

This book presents correct-by-design control techniques for switching systems, using different methods of stability analysis. Switching systems are increasingly used in the electronics and mechanical industries; in power electronics and the automotive industry, for example. This is due to their flexibility and simplicity in accurately controlling industrial mechanisms. By adopting appropriate control rules, we can steer a switching system to a region centered at a desired equilibrium point, while avoiding "unsafe" regions of parameter saturation. The authors explain various correct-by-
