

Part II

Sliding Mode State Estimation for Control Purposes

The second part of this book is concerned with sliding mode state estimation procedures. These estimators are implemented in such a way that their results are directly applicable within closed-loop control structures. In Chap. 5 by Manuel Schimmack and Paolo Mercorelli, a sliding mode control strategy is presented which makes use of a bang-bang observer for the detection of particle pollutions. As in the before-mentioned contribution, Hao Sun and Harald Aschemann present a sliding mode-based closed-loop control strategy in Chap. 6. The focus of this chapter is on the practical implementation and the experimental validation of the corresponding observer-based control structure for a hydrostatic transmission system. Chapter 7, authored by Tristan Braun and Johannes Reuter, focuses on the development of a sliding mode observer that includes an iterative parameter adaption approach for the characterization of a fast-switching solenoid valve. Finally, Chap. 8 by Horst Schulte and Florian Pöschke thoroughly compares linear parameter-varying and Takagi–Sugeno model approaches for the implementation of sliding mode observers that can be employed in the frame of a reliable fault diagnosis.