

## Contents

1. Introduction .....	6
2. Takagi-Sugeno (TS) fuzzy models .....	6
2.1 Stability .....	8
2.2 Quadratic Lyapunov function .....	8
2.2.1 Stability analysis .....	8
2.2.2 Controller synthesis .....	9
2.3 Piecewise quadratic Lyapunov functions .....	10
2.3.1 Stability analysis .....	11
2.3.2 Controller synthesis .....	12
2.4 Fuzzy Lyapunov functions .....	14
2.4.1 Stability analysis .....	14
2.4.2 Controller synthesis .....	14
3. Polynomial fuzzy models .....	15
3.1 Sum of Squares .....	17
3.2 Stability analysis .....	17
4. Conclusions .....	18
5. References .....	19
6. Ing. Petr Hušek, Ph.D. ....	20