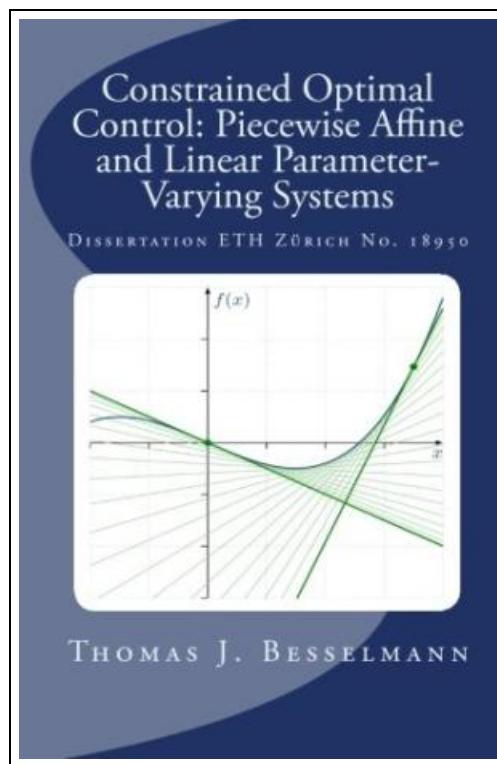


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Createspace, United States, 2010. Paperback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****.The scope of this thesis lies in the field of constrained optimal control. More precisely, it is concerned with the constrained finite-time optimal control of two system classes: piecewise affine systems and linear parameter-varying systems. Firstly, constrained finite-time optimal control (CFTOC) of piecewise affine (PWA) systems is revisited. Since the actual computation of hybrid controllers as the explicit solution to parametric CFTOC problems for piecewise affine systems is already rather mature, this part deals with a post-processing algorithm. If the cost function of the CFTOC problem is quadratic, the optimization problem at hand is a parametric mixed-integer quadratic program, which can be solved by decomposing it into a number of quadratic programs. Thereby redundant regions are computed, which increase the storage demand and the online evaluation time of the resulting controller. We propose a post-processing algorithm for the removal of redundant regions. Furthermore, we examine the application of hybrid control methods to two systems: a mechanical system with backlash and autonomous vehicle steering. The second part of this thesis is devoted to constrained optimal control of linear parameter-varying (LPV) systems. A sequence of dynamic programming procedures is proposed, in order to solve constrained finite-time optimal control problems explicitly for LPV-A systems and for general LPV systems. Both cases of an arbitrarily varying scheduling parameter and a bounded rate of parameter variation are considered. Likewise, a procedure to solve the constrained time-optimal control problems is proposed, enabling a low-complexity alternative to explicit LPV-MPC with guaranteed stability. With these developments, explicit MPC schemes and explicit minimum-time MPC schemes are enriched by the class of LPV systems, increasing the possibilities of their application. Finally, we demonstrate an application of explicit LPV-MPC to autonomous vehicle steering.



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