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Automotive Model Predictive Control

Models, Methods and Applications

- Gives the reader access to the uses of a modern and successful method of control in a most important applications area
- Presents the points of view of industry-based engineers and academic research to give a balanced, practical but cutting-edge perspective

Automotive control has developed over the decades from an auxiliary te- nology to a key element without which the actual performances, emission, safety and consumption targets could not be met. Accordingly, automotive control has been increasing its authority and responsibility – at the price of complexity and di?cult tuning. The progressive evolution has been mainly ledby speci?capplicationsandshorttermtargets,withthe consequencethat automotive control is to a very large extent more heuristic than systematic. Product requirements are still increasing and new challenges are coming from potentially huge markets like India and China, and against this ba- ground there is wide consensus both in the industry and academia that the current state is not satisfactory. Model-based control could be an approach to improve performance while reducing development and tuning times and possibly costs. Model predictive control is a kind of model-based control design approach which has experienced a growing success since the middle of the 1980s for "slow" complex plants, in particular of the chemical and process industry. In the last decades, severaldevelopments haveallowedusing these methods also for "fast"systemsandthis hassupporteda growinginterestinitsusealsofor automotive applications, with several promising results reported. Still there is no consensus on whether model predictive control with its high requi- ments on model quality and on computational power is a sensible choice for automotive control.

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