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# Automotive Model Predictive Control

Models, Methods and Applications

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Automotive control has developed over the decades from an auxiliary technology 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 difficult tuning. The progressive evolution has been mainly led by specific applications and short-term targets, with the consequence that 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 background 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, several developments have allowed using these methods also for “fast” systems and this has supported a growing interest in its use also for automotive applications, with several promising results reported. Still there is no consensus on whether model predictive control with its high requirements on model quality and on computational power is a sensible choice for automotive control.

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