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Parameter adaptive control algorithms – A tutorial

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Abstract

An introduction is given to adaptive (self-tuning) control algorithms with recursive parameter estimation, which have obtained increasing attention in recent years. These algorithms result from combinations of recursive parameter estimation algorithms and easy to design control algorithms. Firstly a short review is given on proper recursive parameter estimation methods, including their application in a closed loop. This is followed by the design equations for various control algorithms and ways for d.c.-value estimation and for offset compensation. Various explicit and implicit combinations can be designed with different properties of the resulting adaptive control algorithms for both deterministic and stochastic disturbances. Their convergence properties are discussed. Simulation examples are presented and examples for the adaptive control of an air conditioner and a pH-process are shown. The introduction of a third feedback level for coordination and supervision is considered. Finally further problems are discussed.



Keywords

Adaptive control; identification; closed-loop parameter estimation; model structure determination; digital control

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