Controller Setup Maximizing Performance

M. Novák[1]

[1] Department of Adaptive Systems, Institute of Information Theory and Automation, Academy of Sciences of the Czech Republic, Prague, Czech Republic

E-mail: mira@utia.cas.cz

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Abstract:

The aim of controller setup is to improve or even to allow the usability of the modern controllers in practice. Properly set up modern controller targets to achieve smaller disturbances and better desired value tracking of the controlled system output quantities than it is available with the classical controllers. Besides the control quality, it is also advantageous from the viewpoint of resources, energy, and production costs. The tuned controller is adjusted to fit to the specified constraints while considering the incomplete knowledge of the controlled system.

The controller tuning task translates the constraints on variables and requirement of best control quality into the controller tuning knob values.

The presented approach of controller tuning is based on controller quality evaluation using Monte-Carlo method. Tuning is performed by the sample path method [1] as stochastic optimization task. The computational efficiency is supported employing stopping rules [2] using Kullback-Leibler divergence. The uncertainty of the controlled plant is treated using Bayesian approach for system identification [3] of ARX and Markov chain models. The controllers used are the LQG controller and a controller based on fully probabilistic design [4]. The resulting algorithms are coded in Matlab.

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