NEW ULTRAFAST AND ROBUST CONTROL ALGORITHM

École de technologie supérieure, ETS-064

BACKGROUND

In the domain of control theory, a controller is used to ensure that a system will produce the expected output response. An example application is a motor vehicule cruise control mechanism where the input is a desired speed, the control variable is the engine's throttle position, and the output is the actual vehicle speed.

In general, to increase the reaction speed of a feedback system, gain has to be increased. However, this principle cannot be applied in a systematic fashion because it can result in oscillations or instability, as is shown in Figure 1 below.

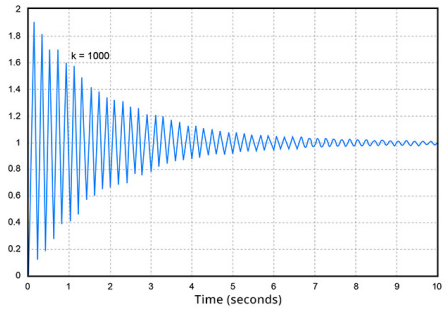

Figure 1 - Time Response of Typical Controllers

TECHNOLOGY

To address this problem, a new, patented algorithm that increases the speed and precision of feedback systems while maintaining stability and robustness has been developed by Prof. David Bensoussan. The algorithm offers the means to remove the difference between stabilization and rise time of controlled systems and it can be adjusted to avoid saturations while maintaining excellent stability and robustness margins. **The algorithm has recently been extended to multivariable systems and ensures decoupling and decentralized control.**

The resulting temporal response of the algorithm is shown in Figure 2.

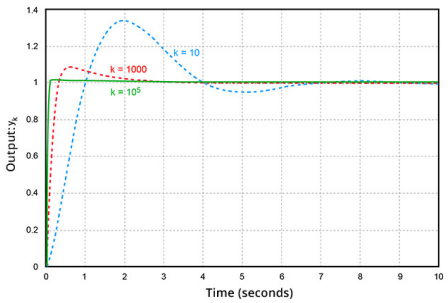

Figure 2 - Temporal Response of the Compensator Designed by Prof. Bensoussan

COMPETITIVE ADVANTAGES

Comparisons with other control methods have shown that this algorithm offers a design methodology that minimizes the response time of controlled systems. It has been tested in practice and experimental results have validated the performance improvements predicted by theory.

The algorithm can find applications in several control systems where stability and response time are important. For example, it can be applied to increase the precision of angular motions of a drone.

TECHNOLOGY DEVELOPMENTAL STAGE

The technology has been tested on a levitation system, and showed that the resulting stabilization time is far superior to the time obtained by other command methods. An explanatory video can be viewed here: http://goo.gl/FK3c57

PATENT STATUS

US 13/217,861 (Granted)

BUSINESS OPPORTUNITY

The technology is available for licensing.

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