It Makes Technological Sense

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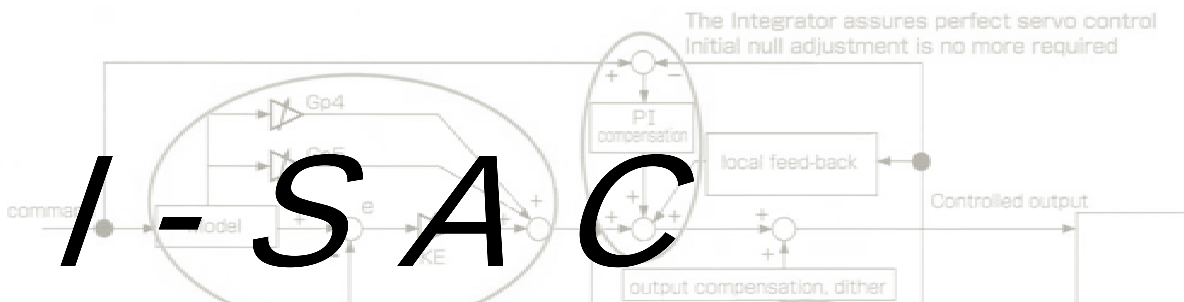
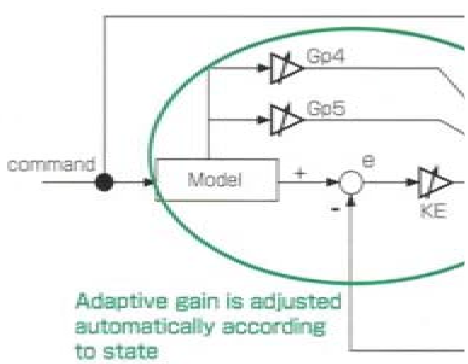


I-SAC

Adaptive Servo Controllers



Using

Simple Adaptive Control (SAC) Theory

Practical Simple Adaptive Controller for all types of Servo Applications

What is the most important expectation from a Servo Controller worthwhile called a good one?

At present, many products named "*Industrial Servo Controller*" are in the market; however, to select a good one for the desired performance is still a difficult task. You need to know what your plant's desired response to be and exactly which performance to be focused on.

We think as follows,

Performance to be expected

In the selection of a servo controller, the following characteristics should be considered as most important and inevitable:

1. Response

- How and at which velocity should your plant's output, such as cylinder-rod displacement, pressure, flow, velocity, temperature, etc., reach to its desired set point?
- The overrun or overshoot has to be evaded in the process of controlled trajectory, while achieving the fastest response possible.

2. Steady-State Error (Set-point Accuracy)

There would be no meaning in the design of a servo system if there remains a substantial difference between the desired and actual response even though it is achieved within the acceptable time. To which degree can you decrease the steady-state error?

Set-point accuracy is the most important requirement for any plant under consideration and that steady-state error must be eliminated for overall system accuracy.

Easy approach to handling and adjustment

Suppose you used a servo controller and were satisfied with the response with respect to above described specifications. Would you say that it is an effective servo controller to the level of satisfaction? What about if controlled performance deteriorated in about half a year due to parameter variations or changes in operating conditions? What about if plant engineer spent half a month to re-adjust controller parameters for the new operating conditions?

Robustness is another essential property of a servo controller for today's highly complex systems.

Today's industrial servo controllers, without any doubt, must possess all of the above listed properties. However, many of them available in the market do not possess these properties. *We therefore invite you to explore and experience the excellent performance presented by the I-SAC adaptive servo controller.*

I-SAC Performance

Controller Specifications

Fig. 1 shows a block diagram of an I-SAC controller. Unlike conventional controllers, I-SAC uses Simple Adaptive Control (SAC) Theory, in which control signal is formed by the adaptive gains from model states in the feedforward and the adaptive gain from an error signal in the feedback. While the Parallel Feedforward Compensator (PFC) assures stability and robustness, added PI compensation provides perfect servo control.

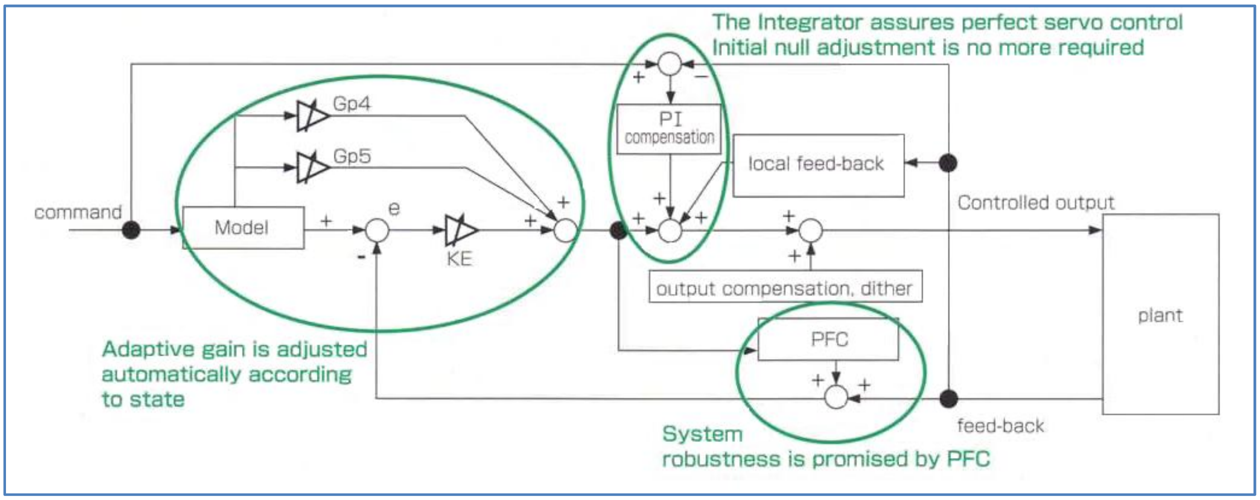


Figure 1: Block diagram of I-SAC

Fig. 2 shows an example of a step response of PID and I-SAC Servo Controller in case of setting target value to one in a typical cylinder-positioning control system. While any PID control has an overshoot and reaching the target in an oscillating mode, I-SAC is realizing a smooth and fast response without any oscillations due to its proprietary high-gain feedback. As to the steady-state error, I-SAC can make it totally zero because of its integration compensation feature.

Robustness against Variance of Circumstances

Fig. 3 illustrates a typical result of I-SAC controller and its superior performance compared to a PID controller. For the cylinder positioning control system (same as in Fig. 2), we gave three different masses to the cylinder while maintaining same parameters for the controllers. As you can see from the figure, the response is unacceptably oscillatory in the case of PID control, which requires re-adjustment of controller parameters by plant engineers. On the other hand, I-SAC provides an excellent robust performance due to its adaptive control structure.

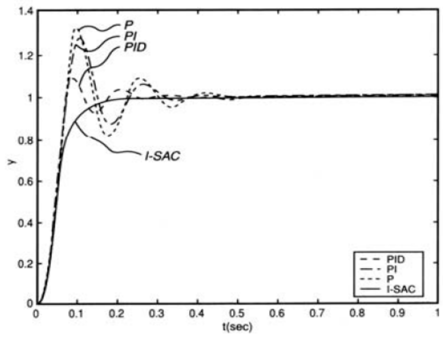


Fig. 2

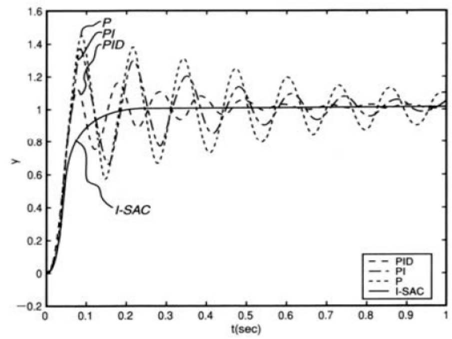


Fig. 3

Adjustments of Parameters

There are only a few parameters to be initially adjusted in the I-SAC. Furthermore, it is not necessary to use gain, phase characteristics and/or transfer function of the system as in PID control. It is just enough if an engineer adjusts confirming response at the very beginning. Now, we hope that you realize I-SAC is the only choice, if you want to design high performance servo controller and also hope that you will utilize our controller to its best replacing PID or other servo controllers. We are confident that you will be extremely satisfied once you use our I-SAC for your variety of control applications.

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