

ABSTRACTMETHODS AND APPARATUS FOR OBTAINING PROCESS CHARACTERISTICS
IN SELF-TUNING CONTROLLERS

The characteristics of a field process system (13) controlled by a self tuning controller (10) are obtained by analyzing the open loop response of the process variable (PV) to a step applied at the controller's control output (11). A first-order system response with pure time delay is used to approximate a higher-order field process system's actual response. The overall deadtime and time constant of the first-order approximation are determined. The maximum slope of the process variable response to the step is stored along with an assigned time of its occurrence and an assigned process variable. The stored information is used to approximate the overall deadtime. In one embodiment the stored information is assumed to be the data obtained from a second-order response having a 10:1 time constant ratio and is used to find the assumed second-order time constants which are used to find the first-order time constant. In a second embodiment the first order time constant is determined by using a convergence point falling within a predetermined range between the actual response data and the first-order approximation. The step is not applied to the control output (11) until the process variable has reached the initial steady state condition and the calculation of slope ceases when the process variable response reaches the final steady state condition. Alternative techniques are disclosed for determining the steady state condition.

Figure 1