

## Intro.perf Performance

1 Control system performance is measured in the following ways.

### Stability

2 A control system must be designed such that the plant's output response is stable: its free response must not diverge from equilibrium.

### Transient Response

3 Transient response of the plant's output is often important for a control system. A designer may have identified such requirements as "the velocity free response must be  $0 \pm 1$  m/s in 5 seconds and thereafter." Or "the pressure step response must not overshoot its final value." These sorts of requirements are common. As with many design techniques, some iteration is usually needed in order to meet all requirements.

### Steady-State Response

4 Steady-state response of the plant's output is another important consideration for a control system. After the transient response has decayed, the steady-state response must meet certain criteria, such as "the position steady-state response to a unit ramp function must be within 5 mm of the desired position."

### Others

5 Cost, weight, complexity, and many other factors must be considered in control system design. One of the most important of these is robustness: the control system's ability to perform as desired when system parameters change from their nominal values. This is important because the parameters of any

implementation of a control system will differ from their nominal values at least slightly.