

2.9 TIME RESPONSE ANALYSIS

- Two types of inputs can be applied to a control system
- Command Input or Reference Input $y_r(t)$
- Disturbance Input $w(t)$

(External disturbances $w(t)$ are typically uncontrolled variations in the load on a control system). In systems controlling mechanical motions, load disturbances may represent forces. In voltage regulating systems, variations in electrical load are a major source of disturbances.

In general, the closed loop transfer function of a system is denoted as $M(s)$.

$$M(s) = \frac{b_0 s^M + b_1 s^{M-1} + b_2 s^{M-2} + \dots + b_{M-1} s + b_M}{a_0 s^N + a_1 s^{N-1} + a_2 s^{N-2} + \dots + a_{N-1} s + a_N}$$

