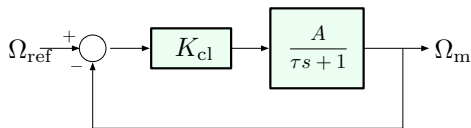


Time Response

Closed-loop



$$\Omega_m = \frac{AK_{cl}}{\tau s + 1 + AK_{cl}} \Omega_{ref}$$

Closed-loop pole at $s = -\frac{1}{\tau} (1 + AK_{cl})$
(the only way to move poles around is *via feedback*)

Now the transient response is $e^{-\frac{1+AK_{cl}}{\tau}t}$, with

$$\text{time constant} = \frac{\tau}{1 + AK_{cl}}$$

— for large K_{cl} , we have a much smaller time constant, i.e.,
faster convergence to steady-state.