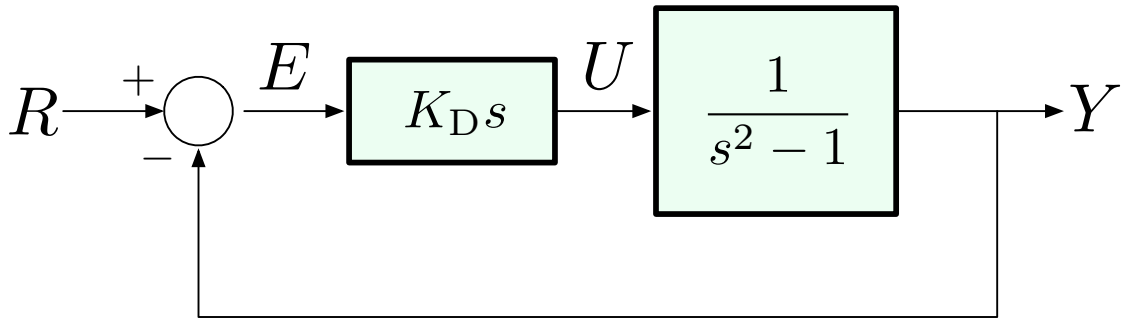
Derivative Feedback

Let's feed the *derivative of the error*, multiplied by some gain, back into the plant:



Motivation: derivative = rate of change; faster change $\Longrightarrow$ more control needed.

Caveat: multiplication by s is not a causal element (why?)

Derivative action and lack of causality: recall

$$\dot{e}(t) \approx \frac{e(t+\delta) - e(t)}{\delta} \qquad \text{(for small } \delta\text{)}$$

— if $\delta > 0$, $e(t+\delta)$ is in the future of $e(t)$!!