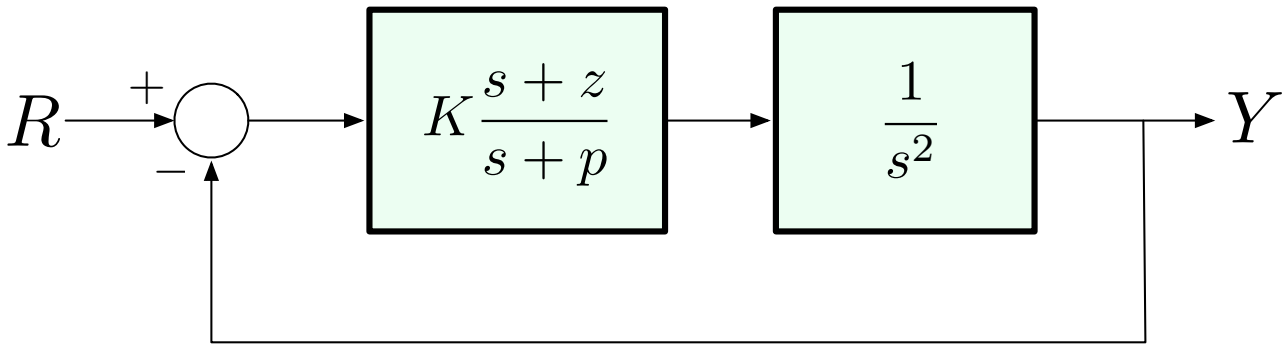
Back to Double Integrator



Controller transfer function is $K\dfrac{s+z}{s+p}$, where:

$$K = K_{\mathrm{P}} + pK_{\mathrm{D}}, \qquad z = \frac{pK_{\mathrm{P}}}{K_{\mathrm{P}} + pK_{\mathrm{D}}} \xrightarrow{p\to\infty} \frac{K_{\mathrm{P}}}{K_{\mathrm{D}}}$$

so, as $p \to \infty$, z tends to a constant, so we get a lead controller.

We use lead controllers as dynamic compensators for approximate PD control.