Steady-State Gain *K*

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Steady-state gain quantifies how much output changes upon *unit* input change

Steady-state gain K - ratio of the output variable change to an sustained input variable change at new steady state

$$K = \frac{\overline{y}_2 - \overline{y}_1}{\overline{u}_2 - \overline{u}_1}$$

Steady state gain is a constant for linear processes.

Steady-state gain can be evaluated from $G(0)$

Ex. Prove that steady-state gain can be evaluated from $G(s)$ by setting $s = 0$ (if the gain exists).

- Final value theorem: $\lim_{t\to\infty}[y(t)] = \lim_{s\to 0}[sY(s)]$

Example: determining steady-state gain

Ex. Determine the steady state gain given transfer function of $G(s) = \dfrac{w_1}{\rho V s + w}$