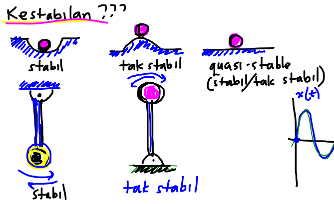
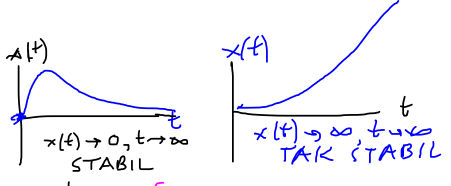
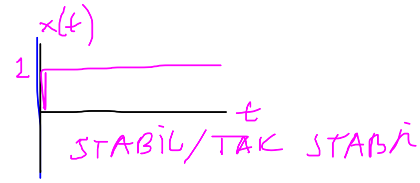
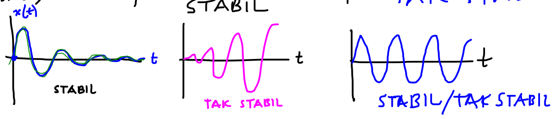
Kestabilan ???









Bab I Pengenalan SISTEM KENDALI
Bab II Alat-alat matematik
Bab III Istilah-istilah khusus
Bab IV KESTABILAN

Tujuan pertama dan utama dari pengendalian adalah men-STABIL-kan sistem. Hanya sistem yang stabil yang dapat ditingkatkan kinerja (performance)-nya

* Sistem Kendali OPTIMAL
* Sistem Kendali ADAPTIF
* Sistem Kendali KOKOH (Robust)
* - - - - -
* Sistem Kendali CERDAS (smart)

AI

Kestabilan ???

Dalam teori kendali, dikenal beberapa DEFINISI kestabilan, misalnya
* Kestabilan Asimptutir
* Kestabilan BIBO (Bounded Input Bounded Output)
* dll

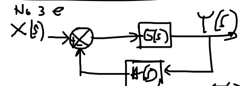
tapi definisi yang banyak digunakan dalam Teori Kendali Klasik adalah sbb.

[Suatu sistem kendali atau kendalian dikatakan STABIL, jika dan hanya jika tanggapan denyut-nya menuju nol]

NISBAH ALIH

Jawaban soal MID

No 3 e



$G(s) = \frac{1}{s}$

$H(s) = \frac{2s+1}{10s+1}$

CLTF $G_T(s) = \frac{G(s)}{1+G(s)H(s)}$

$= \frac{1/s}{1+\left(\frac{1}{s}\right)\left(\frac{2s+1}{10s+1}\right)}$

$= \frac{10s+1}{10s^2+s+2s+1} = \frac{10s+1}{10s^2+3s+1}$

$= \frac{s+0,1}{s^2+0,3s+0,1}$

$\omega_n^2 = 0,1 \longrightarrow \omega_n = \sqrt{0,1}$ rad/sec

$= 0,3162$ rad/sec

$2\xi\omega_n = 0,3 \longrightarrow \xi\omega_n = 0,15 \longrightarrow \xi = \frac{0,15}{\sqrt{0,1}} = 0,2677$

$x(t) = \delta(t) \longrightarrow X(s) = \mathcal{L}\,\delta(t) = 1$

$Y(s) = G(s) = \frac{s+0,1}{s^2+0,3s+0,1} \longrightarrow$ Tanggapan denyut.

$y(t) = \mathcal{L}^{-1} Y(s)$

$= \mathcal{L}^{-1} G(s)$

lihat Tabel $= \mathcal{L}^{-1} \frac{s+0,1}{s^2+0,3s+0,1}$

$= \mathcal{L}^{-1} \frac{s+0,1}{(s+0,15)^2-(0,15)^2+0,1}$

$= \mathcal{L}^{-1} \frac{s+0,1}{(s+0,15)^2+(0,278)^2} \Rightarrow$

$$x(t) = \frac{d^2y(t)}{dt^2} + \frac{dy(t)}{dt} + y(t)$$

$X(s) = s^2Y(s) + sY(s) + Y(s)$

$= (s^2+s+1)Y(s) \longrightarrow G(s) = \frac{Y(s)}{X(s)} = \frac{1}{s^2+s+1}$

$x(t) = \delta(t) \longleftrightarrow y(t) = \mathcal{L}^{-1} G(s)$

$= \mathcal{L}^{-1} \frac{1}{s^2+s+1}$

$\omega_n^2 = 1 \rightarrow \omega_n = 1$ rad/sec

$2\xi\omega_n = 1 \rightarrow \xi = 0,5 \longrightarrow$ teredam lebih

$\omega_d = \omega_n\sqrt{1-\xi^2} = 1\sqrt{1-0,25} = \sqrt{0,75}$ rad/sec

$= \frac{1}{2}\sqrt{3}$ rad/sec

$= 0,866$ rad/sec

$y(t) = \frac{1}{\omega_d} e^{-\xi\omega_n t} \sin \omega_d t$