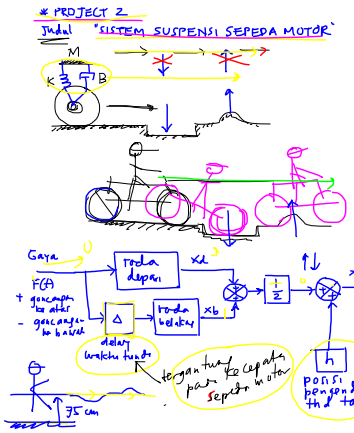
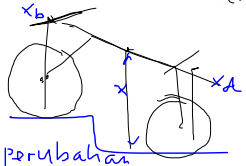




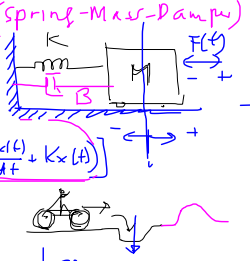
Perubahan
x_b posisi roda belakang terhadap tanah
x_d : posisi roda depan terhadap tanah
$x = \frac{1}{2}(x_b + x_d)$ = posisi pengendara terhadap tanah

+ ke atas
- ke bawah

Hukum Newton :

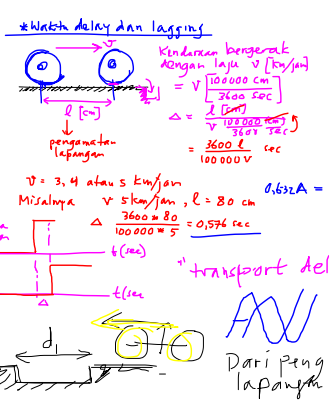
$$F(t) = M\frac{d^2x(t)}{dt^2} + B\frac{dx(t)}{dt} + Kx(t)$$

percepatan kecepatan posisi



$$\frac{d^2x(t)}{dt^2} = \frac{1}{M}\left[F(t) - \left(B\frac{dx(t)}{dt} + Kx(t)\right)\right]$$

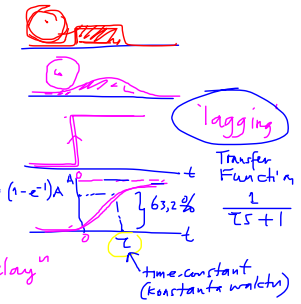
perubahan kecepatan → 0



$$= V\left[\frac{100000\ cm}{3600\ sec}\right]$$

$$\Delta = \frac{l\ [cm]}{V\left[\frac{100000\ cm}{3600\ sec}\right]} = \frac{3600\ l}{100000\ V}\ sec$$

$$\Delta = \frac{3600 \times 80}{100000 \times 5} = 0{,}576\ sec$$



Dari pengamatan lapangan :

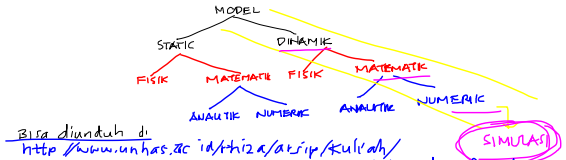
$d_1 = 40$ cm

$$t_1 = \frac{3600\ d_1}{100000\ V}\ sec.$$

$= 0{,}288$ sec

$d_2 = 50$ cm

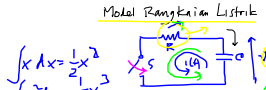
$$t_2 = \frac{3600\ d_2}{100000\ V} = 0{,}36\ sec$$



Bisa diunduh di
http://www.unhas.ac.id/rhiza/arsip/kuliah/
→ Pemodelan dan Simulasi
↳ Dokumentasi 2015 – Kelas C

Project 1
"VERIFIKASI SIMULINK"
Kasus : Pelepasan muatan Kapasitor melalui Resistor

Model Rangkaian Listrik



t=0, Ve(0) = 10 Volt
Saklar S ditutup
t → ∞, Ve(t) → 0

$\int x\,dx = \frac{1}{2}x^2$

$\int x^2\,dx = \frac{1}{3}x^3$

$\int x^{-2}\,dx = -x^{-1}$

Analisis (Hukum Ohm)

(1) $i(t) = -C\frac{dVc(t)}{dt}$

(2) $Ve(t) = R\,i(t) \rightarrow i(t) = \frac{Ve(t)}{R}$

$\frac{Ve(t)}{R} = -C\frac{dVc(t)}{dt}$

Pers. Diff

$$\frac{dVc(t)}{dt} = -\frac{1}{RC}Ve(t), \quad Vc(0) = 10\ Volt$$

$\int \frac{dx}{x} = \ln x$

$$\int \frac{dVe(t)}{Ve(t)} = \int -\left(\frac{1}{RC}\right)dt = -\frac{1}{RC}\int dt = -\frac{t}{RC} + K$$

$\int x^{-1}\,dx = \ln x$

$^e\log x = a$

$x = e^a$

$$\ln[Vc(t)] = -\frac{t}{RC} + K$$

$$^e\log[Ve(t)] = -\frac{t}{RC} + K$$

$$Ve(t) = e^{\left[-\frac{t}{RC}+K\right]} = e^K e^{-\frac{t}{RC}} = Ae^{-t/RC}$$

$t=0 \rightarrow Ve(0) = Ae^0 = A = 10$

Solusi analitik

$$Vc(t) = 10e^{-t/RC}$$

exact

check : (1) $t=0 \rightarrow Vc(0) = 10e^0 = 10$ ✓

$t=\infty \rightarrow Vc(\infty) = 10e^{-\infty} = 0$ ✓

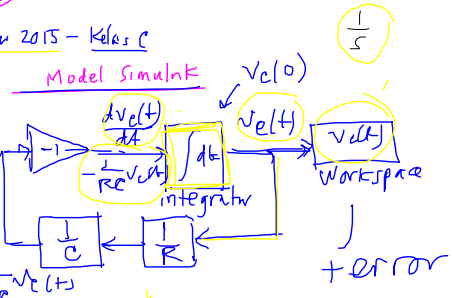
(2) $\frac{dVc(t)}{dt} = (-10)\left(\frac{1}{RC}\right)e^{-t/RC}$

$= -\frac{1}{RC}\,10e^{-t/RC}$

$= -\frac{1}{RC}\,Vc(t)$ ✓

relative tolerance 10^{-3}

t	ANA $10e^{-t/RC}$	SIM	Error
0			0

$Vc(t)$

reference