

sebuah pers. differensial biasa order ke-n:

$$a_n \frac{d^n x(t)}{dt^n} + a_{n-1} \frac{d^{n-1} x(t)}{dt^{n-1}} + a_{n-2} \frac{d^{n-2} x(t)}{dt^{n-2}} + \dots + a_1 \frac{dx(t)}{dt} + a_0 x(t) = u(t)$$

diuraikan menjadi n buah pers. diff. biasa order pertama!

$$x(t) = x_1 \rightarrow \frac{dx(t)}{dt} = \frac{dx_1}{dt} = x_2$$

$$\frac{dx(t)}{dt} = x_2 \rightarrow \frac{d^2 x(t)}{dt^2} = \frac{dx_2}{dt} = x_3$$

$$\frac{d^2 x(t)}{dt^2} = x_3 \rightarrow \frac{d^3 x(t)}{dt^3} = \frac{dx_3}{dt} = x_4$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \frac{d^{n-1} x(t)}{dt^{n-1}} = x_n \rightarrow \frac{d^n x(t)}{dt^n} = \frac{dx_n}{dt} = \dots ?$$

$$\rightarrow a_n \frac{dx_n}{dt} + a_{n-1} x_n + a_{n-2} x_{n-1} + \dots + a_1 x_2 + a_0 x_1 = u(t)$$

$$\frac{dx_n}{dt} = -\frac{a_0}{a_n} x_1 - \frac{a_1}{a_n} x_2 - \dots - \frac{a_{n-2}}{a_n} x_{n-1} - \frac{a_{n-1}}{a_n} x_n + \frac{1}{a_n} u(t)$$