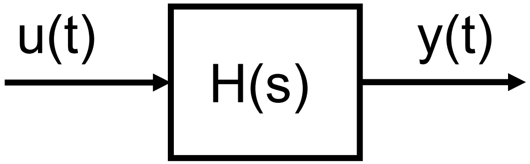
“Pidevaja süsteemide analüüs”

<u>Ülesanne nr.1</u>



Antud: u(t), H(s).

Leida: y(t), y(0), y(∞).

0)
$$\begin{cases} H(s) = \dfrac{s^2 + se^{-s}}{s^2 + 6s + 13} \\ u(t) = \delta(t) \end{cases}$$

2)
$$\begin{cases} H(s) = \dfrac{s^2 + 1}{s^2 + 2s + 1} \\ u(t) = 1(t-1) + \delta(t) \end{cases}$$

1)
$$\begin{cases} H(s) = \dfrac{(s+2)e^{-2s}}{s(s^2 + 2)} \\ u(t) = 1(t) \end{cases}$$

3)
$$\begin{cases} H(s) = \dfrac{(s^2 + 2)e^{-s}}{s^2 + 6s + 9} \\ u(t) = \delta(t-1) \end{cases}$$

4)
$$\begin{cases} H(s) = \dfrac{(s-1)e^{-s}}{(s^2+4s+3)(s+1)} \\ u(t) = 1(t) \end{cases}$$

5)
$$\begin{cases} H(s) = \dfrac{(s-2)e^{-2s}}{(s^2+4)(s+1)} \\ u(t) = \delta(t) \end{cases}$$

6)
$$\begin{cases} H(s) = \dfrac{s^2+2s+1}{s^2+4s+4} \\ u(t) = 1(t) + \delta(t-1) \end{cases}$$

7)
$$\begin{cases} H(s) = \dfrac{s^2+se^{-2s}}{(s^2+6s+5)(s+1)} \\ u(t) = \delta(t) \end{cases}$$

8)
$$\begin{cases} H(s) = \dfrac{(s^2+1)e^{-s}}{s^2+4s+13} \\ u(t) = 1(t-2) \end{cases}$$

9)
$$\begin{cases} H(s) = \dfrac{(s^2+4)e^{-s}}{s^2+2s+10} \\ u(t) = 1(t-1) \end{cases}$$

Ülesanne nr.2

0)

$$\begin{cases} \dfrac{d^2y}{dt^2} + 7\dfrac{dy}{dt} + 12y = 10\dfrac{du}{dt} + 10u \\ \text{Algtingimused}: y(0) = 3,\; y'(0) = 0;\; u(t) = 1(t-1). \\ \\ \text{Leida } y_v(t),\; y_s(t) \text{ ja hüppekaja?} \end{cases}$$

1)

$$\begin{cases} \dfrac{d^2y}{dt^2} + 16y = 2\dfrac{du}{dt} + 5u \\ \text{Algtingimused}: y(0) = 5;\; y'(0) = 2;\; u(t) = e^{-t}. \\ \\ \text{Leida } y_s(t),\; y_v(t),\; y(0),\; y(\infty)? \end{cases}$$

2) $$\begin{cases} \dfrac{d^2y}{dt^2} + 9y = \dfrac{d^2u}{dt^2} - 9u(t) \\ \text{Algtingimused}: y(0) = 2,\ y'(0) = 2;\ u(t) = \delta(t-2). \\ \text{Leida } y_s(t),\ y_v(t) \text{ ja impulsskaja?} \end{cases}$$

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3) $$\begin{cases} H(s) = \dfrac{(s-5)^2}{s^2 + 10s + 26} \\ \text{Algtingimused}: y(0) = -3,\ y'(0) = 4;\ u(t) = 1(t-1). \\ \text{Leida } y_v(t),\ y_s(t) \text{ ja hüppekaja?} \end{cases}$$

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4) $$\begin{cases} \dfrac{d^2y}{dt^2} + 5\dfrac{dy}{dt} + 10y = \dfrac{d^2u}{dt^2} + u \\ \text{Algtingimused}: y(0) = 1,\ y'(0) = 2;\ u(t) = e^{-2t}. \\ \text{Leida } y_v(t),\ y_s(t),\ y(t),\ y(0),\ y(\infty)? \end{cases}$$

5) $$\begin{cases} H(s) = \dfrac{s^2}{s^2 + 4s + 5} \\ \text{Algtingimused}: y(0) = 4,\ y'(0) = -1;\ u(t) = \delta(t-1) + 1(t). \\ \text{Leida } y_v(t),\ y_s(t) \text{ ja impulsskaja?} \end{cases}$$

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6) $$\begin{cases} \dfrac{d^2y}{dt^2} + 8\dfrac{dy}{dt} + 15y = 2\dfrac{du}{dt} + u \\ \text{Algtingimused}: y(0) = -2,\ y'(0) = 2;\ u(t) = 1(t-2). \\ \text{Leida } y_v(t),\ y_s(t) \text{ ja hüppekaja?} \end{cases}$$

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7) $$\begin{cases} H(s) = \dfrac{s^2 - 4s}{s^2 + 5s + 4} \\ \text{Algtingimused}: y(0) = 1,\ y'(0) = 2;\ u(t) = e^{-4t}. \\ \text{Leida } y_v(t),\ y_s(t),\ y(t),\ y(0),\ y(\infty)? \end{cases}$$

8) $$\begin{cases} \dfrac{d^2y}{dt^2} + \dfrac{dy}{dt} + y = \dfrac{d^2u}{dt^2} + u \\ \text{Algtingimused}: y(0) = -1,\ y'(0) = 5;\ u(t) = \delta(t-1). \\ \text{Leida } y_v(t),\ y_s(t) \text{ ja impulsskaja?} \end{cases}$$

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9) $$\begin{cases} H(s) = \dfrac{s-2}{s^2 + 4s + 5} \\ \text{Algtingimused}: y(0) = 5,\ y'(0) = 1;\ u(t) = \sin t. \\ \text{Leida } y_v(t),\ y_s(t),\ y(t),\ y(0),\ y(\infty)? \end{cases}$$

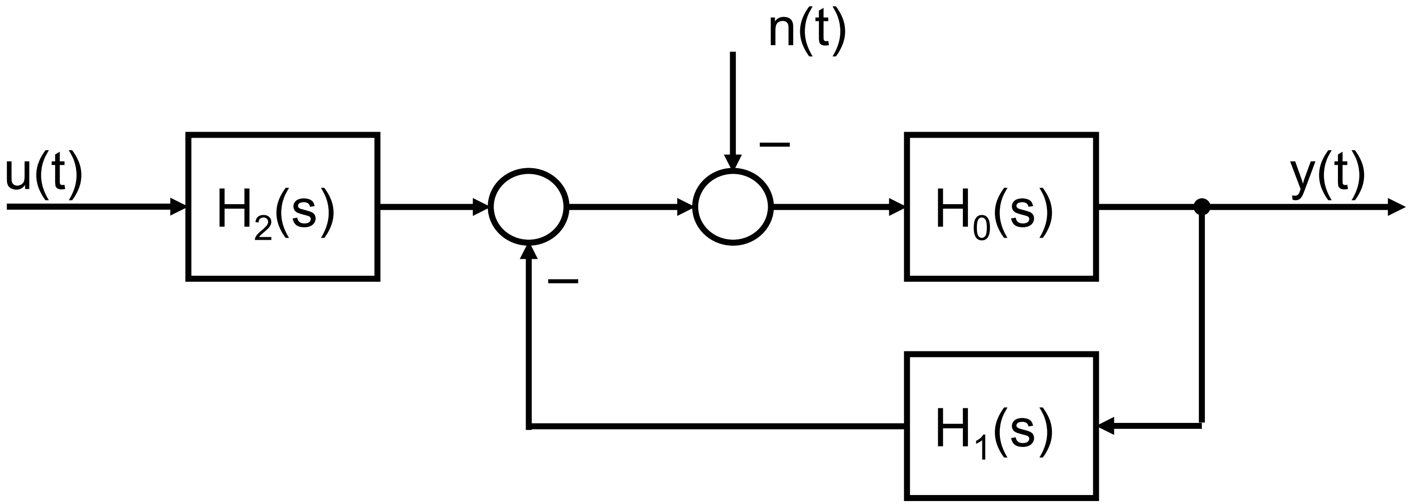
$y_v(t)$ - vabaliikumine

$y_s(t)$ - sundliikumine

$y(t) = y_v(t) + y_s(t)$

Ülesanne nr.3

Variandid: 0, 2, 4, 6, 8

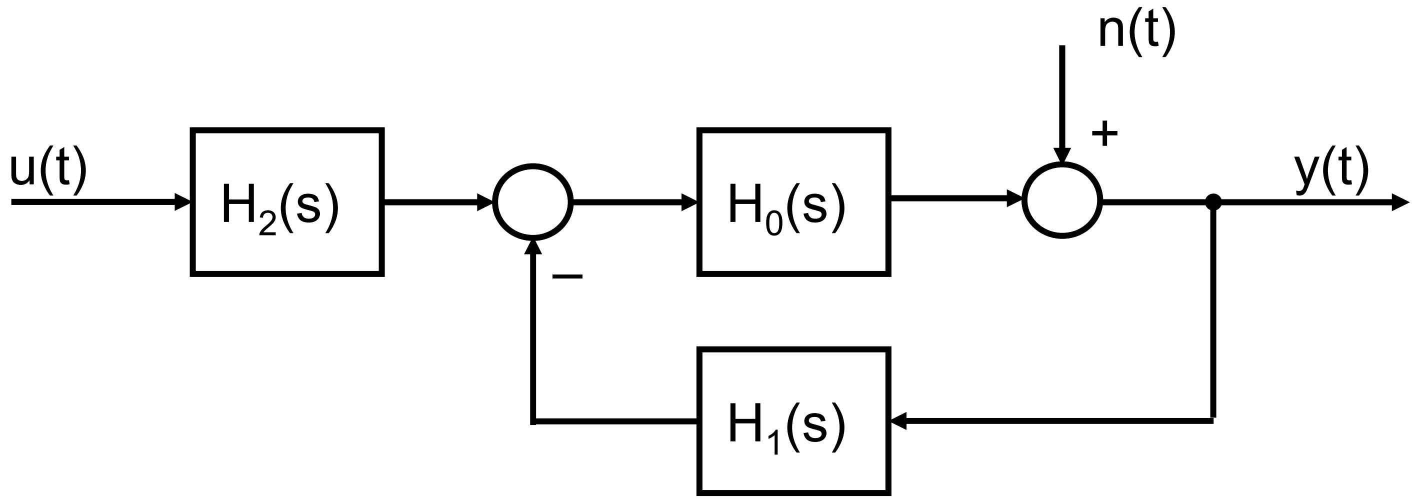


$H_0(s)$, $H_1(s)$, $H_2(s)$ antud lk.9 ja 10.

Leida: 1) Huy(s), Hny(s) ?

2) y(0) ja y(∞), kui $u(t)=2\,1(t)$ ja $n(t)=\delta(t)$?

Variandid: 1, 3, 5, 7, 9



$H_0(s)$, $H_1(s)$, $H_2(s)$ antud lk.9 ja 10.

Leida: 1) Huy(s), Hny(s) ?

2) y(0) ja y(∞), kui $u(t)=5\,1(t)$ ja $n(t)=\delta(t)$?

$H_0(s)$, $H_1(s)$, $H_2(s)$

0) $H_0(s)=\frac{1}{s(s+1)}$ $H_1(s)=\frac{25(s+1)}{s+10}$ $H_2(s)=\frac{25(s+1)}{s+10}$

1) $H_0(s)=\frac{1}{s(s+2)}$ $H_1(s)=\frac{25(s+2)}{s+10}$ $H_2(s)=\frac{25(s+2)}{s+10}$

2) $H_0(s)=\frac{1}{s(s+5)}$ $H_1(s)=\frac{10(s+5)}{s+20}$ $H_2(s)=\frac{10(s+5)}{s+20}$

3) $H_0(s)=\frac{5}{s(s+10)}$ $H_1(s)=\frac{45(s+10)}{s+30}$ $H_2(s)=\frac{45(s+10)}{s+30}$

4) $H_0(s)=\frac{20}{s(s+20)}$ $H_1(s)=\frac{20(s+20)}{s+40}$ $H_2(s)=\frac{20(s+20)}{s+40}$

5) $H_0(s)=\frac{10}{s(s+10)}$ $H_1(s)=\frac{10(s+10)}{s+20}$ $H_2(s)=\frac{10(s+10)}{s+20}$

6) $H_0(s)=\frac{5}{s(s+5)}$ $H_1(s)=\frac{5(s+5)}{s+10}$ $H_2(s)=\frac{5(s+5)}{s+10}$

7) $H_0(s)=\frac{10}{s(s+50)}$ $H_1(s)=\frac{10(s+50)}{s+40}$ $H_2(s)=\frac{10(s+50)}{s+40}$

8) $H_0(s)=\frac{25}{s(s+25)}$ $H_1(s)=\frac{4(s+25)}{s+30}$ $H_2(s)=\frac{4(s+25)}{s+30}$

9) $H_0(s)=\frac{5}{s(s+5)}$ $H_1(s)=\frac{10(s+5)}{s+25}$ $H_2(s)=\frac{10(s+5)}{s+25}$