

Tabela 5.1:

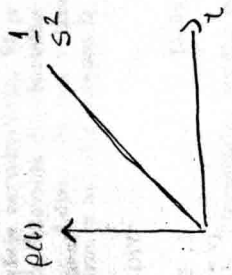
Definicija
 $L\{f(t)\} = \int_0^{\infty} f(t)e^{-st} dt = F(s)$

Teorem linearnosti
 $L\{af(t)\} = aF(s)$

$L\{f_1(t) \pm f_2(t)\} = F_1(s) \pm F_2(s)$

Teorem konačnih vrednosti
 $\lim_{s \rightarrow \infty} sF(s) = \lim_{t \rightarrow \infty} f(t)$

Teorem početnih vrednosti
 $\lim_{s \rightarrow \infty} sF(s) = \lim_{t \rightarrow 0+} f(t)$



Št.	$f(t)$	$F(s)$
1.	$\frac{d f(t)}{d t}$	$sF(s) - f(0-)$
2.	$\frac{d^2 f(t)}{d t^2}$	$s^2 F(s) - s f(0-) - \frac{d f(t)}{d t} (0-)$
3.	$\int f(t) dt$	$\frac{F(s)}{s} + \frac{f(-1)(0-)}{s}$
4.	$\iint f(t) dt^2$	$\frac{F(s)}{s^2} + \frac{f(-1)(0-)}{s^2} + \frac{f'(-1)(0-)}{s}$

Transformacijska tabela

Št.	$f(t)$	$F(s)$
1.	Osnov. konačna funkcija	$\frac{1}{s}$ Konačna
2.	e^{-at}	$\frac{1}{s+a}$ Eksponencijalna - poljen-odgovor
3.	$\sin bt$	$\frac{b}{s^2 + b^2}$ sinusna
4.	$\cos bt$	$\frac{s}{s^2 + b^2}$ cosinusna
5.	$e^{-at} \sin bt$	$\frac{b}{(s+a)^2 + b^2}$
6.	t	$\frac{1}{s^2}$
7.	t^n	$\frac{n!}{s^{n+1}}$
8.	$t^n e^{-at}$	$\frac{n!}{(s+a)^{n+1}}$
9.	$t \cos bt$	$\frac{s^2 - b^2}{(s^2 + b^2)^2}$
10.	$t \sin bt$	$\frac{2bs}{(s^2 + b^2)^2}$

cosouhe → *poljen-odgovor*

Nadaljevanje tabele 5.1:

Inverzna transformacijska tabela

Št.	$F(s)$	$f(t)$
1.	$\frac{1}{1+Ts}$	$\left(\frac{1}{T}\right) e^{-t/T}$
2.	$\frac{1}{(1+Ts)^2}$	$\left(\frac{1}{T^2}\right) t e^{-t/T}$
3.	$\frac{s}{s(1+Ts)}$	$1 - e^{-t/T}$
4.	$\frac{1}{s(1+Ts)^2}$	$1 - \frac{(T+t)}{T} e^{-t/T}$
5.	$\frac{1}{s^2(1+Ts)}$	$T(e^{-t/T} + \frac{1}{T} - 1)$
6.	$\frac{1}{1 + \frac{s^2}{\omega^2}}$	$\omega \sin \omega t$
7.	$\frac{1}{s(1 + \frac{s^2}{\omega^2})}$	$1 - \cos \omega t$
8.	$\frac{1}{1 - \frac{s^2}{\omega^2}}$	$-\omega \sinh \omega t$
9.	$\frac{1}{1 + 2\zeta \frac{s}{\omega} + \frac{s^2}{\omega^2}}$	$\frac{\omega}{\sqrt{1-\zeta^2}} e^{-\zeta \omega t} \sin(\omega \sqrt{1-\zeta^2} t)$
10.	$\frac{1}{s(1 + 2\zeta \frac{s}{\omega} + \frac{s^2}{\omega^2})}$	$1 - \frac{1}{\sqrt{1-\zeta^2}} e^{-\zeta \omega t} \sin(\omega \sqrt{1-\zeta^2} t - \psi)$ $\psi = \tan^{-1} \frac{\sqrt{1-\zeta^2}}{\zeta}$ ($\tan^{-1} \geq \text{arc tg}$)
11.	$\frac{1}{(1+\eta_1 s)(1+\eta_2 s)}$	$\frac{1}{\eta_1 - \eta_2} (e^{-\eta_1 t} - e^{-\eta_2 t})$
12.	$\frac{1}{s(1+\eta_1 s)(1+\eta_2 s)}$	$1 + \frac{1}{\eta_2 - \eta_1} (\eta_1 e^{-\eta_1 t} - \eta_2 e^{-\eta_2 t})$
13.	$\frac{1}{s^2(1+\eta_1 s)(1+\eta_2 s)}$	$t - \eta_1 - \eta_2 - \frac{1}{\eta_1 - \eta_2} [\eta_2^2 e^{-\eta_1 t} - \eta_1^2 e^{-\eta_2 t}]$
14.	$\frac{s}{1 + 2\zeta \frac{s}{\omega} + \frac{s^2}{\omega^2}}$	$\frac{\omega^2 e^{-\zeta \omega t} \sin(\omega \sqrt{1-\zeta^2} t + \psi)}{\sqrt{1-\zeta^2}}$ $\psi = \tan^{-1} \frac{\sqrt{1-\zeta^2}}{-\zeta}$ ($\tan^{-1} \geq \text{arc tg}$)
15.	$\frac{s}{1 + \frac{s^2}{\omega^2}}$	$\omega^2 \cos \omega t$
16.	$\frac{s}{(1+\eta_1 s)(1+\eta_2 s)}$	$\frac{1}{\eta_1 \eta_2 (\eta_1 - \eta_2)} (\eta_1 e^{-\eta_1 t} - \eta_2 e^{-\eta_2 t})$

Tabela s teoremi in Laplaceovimi transformacijami

Definicija

$$L\{f(t)\} = \int_0^{\infty} f(t)e^{-st} dt = F(s)$$

Teorem linearnosti

$$L\{af(t)\} = aF(s)$$

$$L\{f_1(t) \pm f_2(t)\} = F_1(s) \pm F_2(s)$$

Teorem končnih vrednosti

$$\lim_{s \rightarrow 0} sF(s) = \lim_{t \rightarrow \infty} f(t)$$

Teorem začetnih vrednosti

$$\lim_{s \rightarrow \infty} sF(s) = \lim_{t \rightarrow 0^+} f(t)$$

Št.	$f(t)$	$F(s)$
1.	$\frac{df(t)}{dt}$	$sF(s) - f(0^-)$
2.	$\frac{d^2f(t)}{dt^2}$	$s^2F(s) - sf(0^-) - \frac{df(t)}{dt}(0^-)$
3.	$\int f(t) dt$	$\frac{F(s)}{s} + \frac{f(-1)(0^-)}{s}$
4.	$\iint f(t) dt dt^2$	$\frac{F(s)}{s^2} + \frac{f(-1)(0^-)}{s^2} + \frac{f(-2)(0^-)}{s}$

Transformacijska tabela

Št.	$f(t)$	$F(s)$
1.	Osnov. krožna funkcija	$\frac{1}{s}$
2.	e^{-at}	$\frac{1}{s+a}$
3.	$\sin bt$	$\frac{b}{s^2 + b^2}$
4.	$\cos bt$	$\frac{s}{s^2 + b^2}$
5.	$e^{-at} \sin bt$	$\frac{b}{(s+a)^2 + b^2}$
6.	t	$\frac{1}{s^2}$
7.	t^n	$\frac{n!}{s^{n+1}}$
8.	$t^n e^{-at}$	$\frac{n!}{(s+a)^{n+1}}$
9.	$t \cos bt$	$\frac{s^2 - b^2}{(s^2 + b^2)^2}$
10.	$t \sin bt$	$\frac{2bs}{(s^2 + b^2)^2}$

Inverzna transformacijska tabela

Št.	$F(s)$	$f(t)$
1.	$\frac{1}{1 + Ts}$	$\left(\frac{1}{T}\right) e^{-t/T}$
2.	$\frac{1}{(1 + Ts)^2}$	$\left(\frac{t}{T^2}\right) e^{-t/T}$
3.	$\frac{1}{s(1 + Ts)}$	$1 - e^{-t/T}$
4.	$\frac{1}{s^2(1 + Ts)^2}$	$1 - \frac{(T+t)}{T} e^{-t/T}$
5.	$\frac{1}{s^2(1 + Ts)}$	$T \left(e^{-t/T} \cdot \frac{t}{T} - t \right)$
6.	$\frac{1}{1 + \frac{s^2}{\omega^2}}$	$\omega \sin \omega t$
7.	$\frac{1}{s \left(1 + \frac{s^2}{\omega^2} \right)}$	$1 - \cos \omega t$
8.	$\frac{1}{1 - \frac{s^2}{\omega^2}}$	$-\omega \sinh \omega t$
9.	$\frac{1}{1 + 2\zeta \frac{s}{\omega} + \frac{s^2}{\omega^2}}$	$\frac{\omega}{\sqrt{1 - \zeta^2}} e^{-\zeta \omega t} \sin(\sqrt{1 - \zeta^2} t)$
10.	$\frac{1}{s \left(1 + 2\zeta \frac{s}{\omega} + \frac{s^2}{\omega^2} \right)}$	$1 - \frac{1}{\sqrt{1 - \zeta^2}} e^{-\zeta \omega t} \sin(\omega \sqrt{1 - \zeta^2} (t - \varphi))$ $\varphi = \tan^{-1} \frac{\sqrt{1 - \zeta^2}}{-\zeta}$ (\tan^{-1} ali \arctg)
11.	$\frac{1}{(1 + T_1 s)(1 + T_2 s)}$	$\frac{1}{T_1 - T_2} (e^{-t/T_1} - e^{-t/T_2})$
12.	$\frac{1}{s(1 + T_1 s)(1 + T_2 s)}$	$1 + \frac{1}{T_2 - T_1} (T_1 e^{-t/T_1} - T_2 e^{-t/T_2})$
13.	$\frac{1}{s^2(1 + T_1 s)(1 + T_2 s)}$	$t - T_1 - T_2 - \frac{1}{T_2 - T_1} [T_2^2 e^{-t/T_2} - T_1^2 e^{-t/T_1}]$
14.	$\frac{s}{1 + 2\zeta \frac{s}{\omega} + \frac{s^2}{\omega^2}}$	$\frac{\omega^2 e^{-\zeta \omega t} \sin(\omega \sqrt{1 - \zeta^2} (t - \varphi))}{\sqrt{1 - \zeta^2}}$ $\varphi = \tan^{-1} \frac{\sqrt{1 - \zeta^2}}{-\zeta}$ (\tan^{-1} ali \arctg)
15.	$\frac{s}{1 + \frac{s^2}{\omega^2}}$	$\omega^2 \cos \omega t$
16.	$\frac{s}{(1 + T_1 s)(1 + T_2 s)}$	$\frac{1}{T_1 T_2 (T_1 - T_2)} (T_1 e^{-t/T_1} - T_2 e^{-t/T_2})$

St.	$f(t)$	$F(s)$
1.	$1(t)$	$\frac{1}{s}$
2.	e^{-at}	$\frac{1}{s+a}$
3.	$\frac{e^{-at}-e^{-bt}}{b-a}$	$\frac{1}{(s+a)(s+b)}$
4.	$\frac{1}{ab} + \frac{be^{-at}-ae^{-bt}}{ab(a-b)}$	$\frac{1}{s(s+a)(s+b)}$
5.	$\sin \omega t$	$\frac{\omega}{s^2 + \omega^2}$
6.	$\cos \omega t$	$\frac{s}{s^2 + \omega^2}$
7.	$\frac{1}{\omega^2}(1-\cos \omega t)$	$\frac{1}{s(s^2 + \omega^2)}$
8.	t^n	$\frac{n!}{s^{n+1}}$
9.	$t^n e^{-at}$	$\frac{n!}{(s+a)^{n+1}}$
10.	$\frac{1}{\omega} e^{-at} \sin \omega t$	$\frac{1}{(s+a)^2 + \omega^2}$
11.	$e^{-at} \cos \omega t$	$\frac{s+a}{(s+a)^2 + \omega^2}$
12.	$t \cos \omega t$	$\frac{s^2 - \omega^2}{(s^2 + \omega^2)^2}$
13.	$t \sin \omega t$	$\frac{2\omega s}{(s^2 + \omega^2)^2}$
14.	$\frac{e^{-at} + at - 1}{a^2}$	$\frac{1}{s^2(s+a)}$
15.	$[(a_0 - a)t + 1]e^{-at}$	$\frac{s+a_0}{(s+a)^2}$

St.	$f(t)$	$F(s)$
16.	$\frac{1-(1+at)e^{-at}}{a^2}$	$\frac{1}{s^2(s+a)^2}$
17.	$\frac{1-(1+at)e^{-at}}{a^2}$	$\frac{1}{s(s+a)^2}$
18.	$\frac{a_0}{a^2} + (\frac{a-a_0}{a}t - \frac{a_0}{a^2})e^{-at}$	$\frac{s+a_0}{s(s+a)^2}$
19.	$\frac{1}{\omega^2}t - \frac{1}{\omega^3}\sin \omega t$	$\frac{1}{(s^2 + \omega^2)s^2}$
20.	$\frac{1}{\omega^3} \text{sh} \omega t - \frac{1}{\omega^2}t$	$\frac{1}{(s^2 - \omega^2)s^2}$
21.	$\frac{1}{\omega^3} \text{sh} \omega t - \frac{1}{\omega^2}t$	$\frac{1}{(s^2 - \omega^2)s^2}$
22.	$\frac{1}{2\omega}t \sin \omega t$	$\frac{s}{(s^2 + \omega^2)^2}$
23.	$\frac{1}{2\omega}(\sin \omega t + \omega t \cos \omega t)$	$\frac{s^2}{(s^2 + \omega^2)^2}$