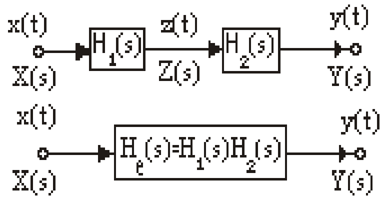

Fig. 6.17a Două sisteme conectate în serie şi sistemul echivalent.

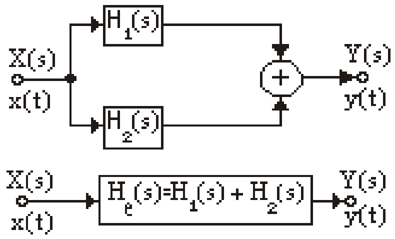

Fig. 6.17b Două sisteme conectate în paralel şi sistemul echivalent.

Pentru cazul sistemelor conectate în paralel - figura 6.17 b - este uşor de dedus relaţia:

$$H_e(s) = H_1(s) + H_2(s) \quad . \tag{6.79}$$

Sistemul echivalent are drept funcţie de transfer suma funcţiilor de transfer ale sistemelor conectate în parallel.

Tabelul 6.1 Proprietăţile transformării Laplace

Semnalul	**Transformarea bilaterală**		**Transformarea unilaterală**
	Transformata	**Domeniul de convergenţă**	
$x(t)$	$X(s)$	DC^x	$X_u(s)$
$y(t)$	$Y(s)$	DC^y	$Y_u(s)$
$ax(t)+by(t)$	$aX(s)+bY(s)$	$DC^x \cap DC^y$ *cel putin*	$aX_u(s)+bY_u(s)$
$x(t-t_o)\,,\,t_o \in \mathbb{R}$	$e^{-st_o}X(s)$	DC^x	—
$x(t-t_o)\,,\,t_o>0$	$e^{-st_o}X(s)$	DC^x	$e^{-st_o}X_u(s)$
$e^{s_o t}x(t)$	$X(s-s_o)$	DC^x *deplasat*	$X_u(s-s_o)$
$x(at), a\in\mathbb{R}^*$	$\frac{1}{\lvert a\rvert}X\left(\frac{s}{a}\right)$	DC^x *scalat*	—
$x(at), a>0$	$\frac{1}{a}X\left(\frac{s}{a}\right)$	DC^x *scalat*	$\frac{1}{a}X\left(\frac{s}{a}\right)$
$x(t)*y(t)$	$X(s)Y(s)$	$DC^x \cap DC^y$ *cel putin*	$X_u(s)Y_u(s)$

Semnalul	Transformarea bilaterală		Transformarea unilaterală
	Transformata	Domeniul de convergenţă	
$\frac{d}{dt}x(t)$	$sX(s)$	DC^{x} cel putin	$sX_u(s) - x(0^+)$
$-tx(t)$	$\frac{d}{ds}X(s)$	DC^{x}	$\frac{d}{ds}X_u(s)$
$(-t)^n x(t)$	$\frac{d^n}{ds^n}X(s)$	DC^{x}	$\frac{d^n}{ds^n}X_u(s)$
$x(t)y(t)$	$\frac{1}{2\pi j}\oint_{\Gamma} X(u)Y(s-u)du$	$\Gamma \subset DC^{x} \cap DC^{y}$ cel putin	$\frac{1}{2\pi j}\oint_{\Gamma} X(u)Y(s-u)du$
$\int_{-\infty}^{t} x(\tau)d\tau$	$\frac{1}{s}X(s)$	$DC^{x} \cap \{\mathrm{Re}\{s\}>0\}$ cel putin	—
$\int_{0}^{t} x(\tau)d\tau$	$\frac{1}{s}X(s)$	$DC^{x} \cap \{\mathrm{Re}\{s\}>0\}$ cel putin	$\frac{X_u(s) + x^{(-1)}(0)}{s}$ $x^{-1}(s)$-valoarea iniţială a integralei
$x(t) = x(t)\sigma(t)$	$x(0^+) = \lim_{s\to\infty} sX(s)$		$x(0^+) = \lim_{s\to\infty} sX_u(s)$
$x(t) = x(t)\sigma(t)$	$x(\infty) = \lim_{s\to 0} sX(s)$		$x(\infty) = \lim_{s\to 0} sX_u(s)$

Tabelul 6.2 Perechi semnal-transformată Laplace

Pentru semnalele cauzale X(s) = X_u(s) iar pentru cele necauzale există numai X(s).

Semnalul	Transformata	Domeniul de convergenţă
$\delta(t)$	1 $(constanta)$	$\forall s$
$\sigma(t)$	$\frac{1}{s}$	$Re\{s\} > 0$
$*$ $-\sigma(-t)$	$\frac{1}{s}$	$Re\{s\} < 0$
$\frac{t^{n-1}}{(n-1)!}\sigma(t)$	$\frac{1}{s^n}$	$Re\{s\} > 0$

Semnalul	Transformata	Domeniul de convergenţă
* $-\dfrac{t^{n-1}}{(n-1)!}\sigma(-t)$	$\dfrac{1}{s^n}$	$Re\{s\} < 0$
$e^{-at}\sigma(t)$	$\dfrac{1}{s+a}$	$Re\{s\} > -a$
* $-e^{-at}\sigma(-t)$	$\dfrac{1}{s+a}$	$Re\{s\} < -a$
$\dfrac{t^{n-1}}{(n-1)!}e^{-at}\sigma(t)$	$\dfrac{1}{(s+a)^n}$	$Re\{s\} > -a$
* $-\dfrac{t^{n-1}}{(n-1)!}e^{-at}\sigma(-t)$	$\dfrac{1}{(s+a)^n}$	$Re\{s\} < -a$
$\delta(t-t_o)$; $t_o>0$	e^{-st_o}	$\forall s$
$(\cos\omega_o t)\sigma(t)$	$\dfrac{s}{s^2+\omega_o^2}$	$Re\{s\} > 0$
$(\sin\omega_o t)\sigma(t)$	$\dfrac{\omega_o}{s^2+\omega_o^2}$	$Re\{s\} > 0$
$(e^{-at}\cos\omega_o t)\sigma(t)$	$\dfrac{s+a}{(s+a)^2+\omega_o^2}$	$Re\{s\} > -a$
$(e^{-at}\sin\omega_o t)\sigma(t)$	$\dfrac{\omega_o}{(s+a)^2+\omega_o^2}$	$Re\{s\} > -a$
$J_0(at)\sigma(t)$	$\dfrac{1}{\sqrt{s^2+a^2}}$	$Re\{s\} > -\lvert a\rvert$