LAPLACEOVA TRANSFORMACIJA

S pomočjo nekega integrala realni funkciji f priredimo neko novo funkcijo F kompleksne spremenljivke

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

Postopek:

$$f(t) \rightsquigarrow \mathcal{L}(f) = F \rightsquigarrow \mathcal{L}^{-1}(F)$$

$\uparrow$ Laplaceova transformacija

$\uparrow$ inverzna Laplaceova transformacija

LASTNOSTI:

1. $\mathcal{L}(af(t) + bg(t)) = aF(s) + bG(s)$
2. $\mathcal{L}(af(t)) = aF(t)$
3. $\lim\limits_{s\to\infty} F(s) = 0$

TABELA:

f(t)	**F(s)**
1	$\frac{1}{s}$
t	$\frac{1}{s^2}$
$t^n \quad ; n \in \mathbb{N}$	$\frac{n!}{s^{n+1}}$
$e^{at} \quad ; a \in \mathbb{R}$	$\frac{1}{s-a}$
$t^n e^{-at}$	$\frac{n!}{(s+a)^{n+1}}$
$\sin \omega t$	$\frac{\omega}{\omega^2+s^2}$
$\cos \omega t$	$\frac{s}{\omega^2+s^2}$
$f(at)$	$\frac{1}{\lvert a\rvert}F(\frac{s}{a})$
$e^{at}ft$	$F(s-a)$
$f(t-a)$	$F(s)e^{-as}$
$tf(t)$	$-F'(s)$
$t^n f(t)$	$(-1)^n F^{(n)}(s)$
$f'(t)$	$sF(s) - f(0)$
$f''(s)$	$s^2F(s) - sf(0) - f'(0)$
$f^{(n)}$	$s^nF(s) - s^{n-1}f(0) - \ldots - f^{n-1}(0)$
$(f * g)(t) = \int_0^t f(u)g(t-u)du$	$F(s)G(s)$