APÊNDICE C

Tabela de Transformadas de Laplace

Transformada de Laplace $F(s)$	Função do Tempo $f(t)$
1	Função impulso unitário $\delta(t)$
$\frac{1}{s}$	Função degrau unitário $u_s(t)$
$\frac{1}{s^2}$	Função rampa unitária t
$\frac{n!}{s^{n+1}}$	$t^n (n = \text{inteiro positivo})$
$\frac{1}{s+\alpha}$	$e^{-\alpha t}$
$\frac{1}{(s+\alpha)^2}$	$te^{-\alpha t}$
$\frac{n!}{(s+\alpha)^{n+1}}$	$t^n e^{-\alpha t} (n = \text{inteiro positivo})$
$\frac{1}{(s+\alpha)(s+\beta)}$	$\frac{1}{\beta-\alpha}\left(e^{-\alpha t} - e^{-\beta t}\right)(\alpha \neq \beta)$
$\frac{s}{(s+\alpha)(s+\beta)}$	$\frac{1}{\beta-\alpha}\left(\beta e^{-\beta t} - \alpha e^{-\alpha t}\right)(\alpha \neq \beta)$
$\frac{1}{s(s+\alpha)}$	$\frac{1}{\alpha}(1 - e^{-\alpha t})$
$\frac{1}{s(s+\alpha)^2}$	$\frac{1}{\alpha^2}(1 - e^{-\alpha t} - \alpha t e^{-\alpha t})$
$\frac{1}{s^2(s+\alpha)}$	$\frac{1}{\alpha^2}(\alpha t - 1 + e^{-\alpha t})$
$\frac{1}{s^2(s+\alpha)^2}$	$\frac{1}{\alpha^2}\left[t - \frac{2}{\alpha} + \left(t + \frac{2}{\alpha}\right)e^{-\alpha t}\right]$
$\frac{s}{(s+\alpha)^2}$	$(1 - \alpha t)e^{-\alpha t}$

Transformada de Laplace $F(s)$	Função do Tempo $f(t)$
$\dfrac{\omega_n}{s^2+\omega_n^2}$	$\text{sen } \omega_n t$
$\dfrac{s}{s^2+\omega_n^2}$	$\cos \omega_n t$
$\dfrac{\omega_n^2}{s(s^2+\omega_n^2)}$	$1-\cos \omega_n t$
$\dfrac{\omega_n^2(s+\alpha)}{s^2+\omega_n^2}$	$\omega_n\sqrt{\alpha^2+\omega_n^2}\ \ \text{sen}\,(\omega_n t+\theta)$ em que $\theta=\tan^{-1}(\omega_n/\alpha)$
$\dfrac{\omega_n}{(s+\alpha)(s^2+\omega_n^2)}$	$\dfrac{\omega_n}{\alpha^2+\omega_n^2}e^{-\alpha t}+\dfrac{1}{\sqrt{\alpha^2+\omega_n^2}}\ \text{sen}(\omega_n t-\theta)$ em que $\theta=\tan^{-1}(\omega_n/\alpha)$
$\dfrac{\omega_n^2}{s^2+2\zeta\omega_n s+\omega_n^2}$	$\dfrac{\omega_n}{\sqrt{1-\zeta^2}}e^{-\zeta\omega_n t}\,\text{sen}\,\omega_n\sqrt{1-\zeta^2}\ t(\zeta<1)$
$\dfrac{\omega_n^2}{s(s^2+2\zeta\omega_n s+\omega_n^2)}$	$1-\dfrac{1}{\sqrt{1-\zeta^2}}e^{-\zeta\omega_n t}\,\text{sen}\left(\omega_n\sqrt{1-\zeta^2}\ t+\theta\right)$ em que $\theta=\cos^{-1}\zeta\quad(\zeta<1)$
$\dfrac{s\omega_n^2}{s^2+2\zeta\omega_n s+\omega_n^2}$	$\dfrac{-\omega_n^2}{\sqrt{1-\zeta^2}}e^{-\zeta\omega_n t}\,\text{sen}\left(\omega_n\sqrt{1-\zeta^2}\ t-\theta\right)$ em que $\theta=\cos^{-1}\zeta\quad(\zeta<1)$
$\dfrac{\omega_n^2(s+\alpha)}{s^2+2\zeta\omega_n s+\omega_n^2}$	$\omega_n\sqrt{\dfrac{\alpha^2-2\alpha\zeta\omega_n+\omega_n^2}{1-\zeta^2}}e^{-\zeta\omega_n t}\,\text{sen}\left(\omega_n\sqrt{1-\zeta^2}\ t+\theta\right)$ em que $\theta=\tan^{-1}\dfrac{\omega_n\sqrt{1-\zeta^2}}{\alpha-\zeta\omega_n}\quad(\zeta<1)$
$\dfrac{\omega_n^2}{s^2(s^2+2\zeta\omega_n s+\omega_n^2)}$	$t-\dfrac{2\zeta}{\omega_n}+\dfrac{1}{\omega_n\sqrt{1-\zeta^2}}e^{-\zeta\omega_n t}\,\text{sen}\left(\omega_n\sqrt{1-\zeta^2}\ t+\theta\right)$ em que $\theta=\cos^{-1}(2\zeta^2-1)\quad(\zeta<1)$