Formelblad Tillämpad matematik

Fourierserie

$$f \sim \frac{1}{2}a_0 + \sum_{k=1}^{\infty} \left(a_k \cos(k\Omega x) + b_k \sin(k\Omega x)\right)$$

$$a_k = \frac{2}{T}\int_{per} f(x)\cos(k\Omega x)\,dx \qquad b_k = \frac{2}{T}\int_{per} f(x)\sin(k\Omega x)\,dx$$

$$\Omega = \frac{2\pi}{T}$$

Cosinusserie

$$f \sim \frac{1}{2}\alpha_0 + \sum_{k=1}^{\infty} \alpha_k \cos(\frac{k\pi}{L}x)$$

$$\alpha_k = \frac{2}{L}\int_0^L f(x)\cos(\frac{k\pi}{L}x)\,dx$$

Sinusserie

$$f \sim \sum_{k=1}^{\infty} \beta_k \sin(\frac{k\pi}{L}x)$$

$$\beta_k = \frac{2}{L}\int_0^L f(x)\sin(\frac{k\pi}{L}x)\,dx$$

Värmeledningsekvationen

$$\frac{\partial u}{\partial t} - a\Delta u = \frac{p}{c\rho}$$

Diffusionsekvationen

$$\frac{\partial u}{\partial t} - D\Delta u = p$$

Vågekvationen

$$\frac{\partial^2 u}{\partial t^2} - c^2\Delta u = \frac{f}{\rho}$$

Några Laplacetransformer

$$\theta(t) = \begin{cases} 0, & t < 0 \\ 1, & t > 0 \end{cases}$$

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

	f	$F = \mathcal{L}f$
1	$af(t) + bg(t)$	$aF(s) + bG(s)$
2	$e^{at} f(t)$	$F(s-a)$
3	$f(t-a)$	$e^{-as} F(s)$
4	$tf(t)$	$-F'(s)$
5	$f'(t)$	$sF(s)$
6	$\int_{-\infty}^{t} f(\tau) d\tau$	$\frac{1}{s} F(s)$
7	$f(at)$	$\frac{1}{\lvert a \rvert} F\left(\frac{s}{a}\right)$
8	$\theta(t) f'(t)$	$s\mathcal{L}(\theta f) - f(0)$
9	$\delta(t)$	1
10	$\theta(t)$	$\frac{1}{s}$
11	$t^n \theta(t)$	$\frac{n!}{s^{n+1}}$
12	$e^{at} \theta(t)$	$\frac{1}{s-a}$
13	$t^n e^{at} \theta(t)$	$\frac{n!}{(s-a)^{n+1}}$
14	$\cos bt\, \theta(t)$	$\frac{s}{s^2 + b^2}$
15	$\sin bt\, \theta(t)$	$\frac{b}{s^2 + b^2}$