Zeit	Raum
t	x
T	λ
$\omega = \frac{2\pi}{T}$	$k = \frac{2\pi}{\lambda}$ Wellenzahl

$\lambda = cT$

$k = \frac{1}{c}\omega$

$$k = \frac{2\pi}{\lambda} = \frac{2\pi f}{\lambda \cdot f} = \frac{\omega}{c}$$

$$\phi(x,t) = A\cos\left(\omega\left(t - \frac{x}{c}\right)\right)$$
$$= A\cos\left(\omega t - \frac{\omega x}{c}\right)$$
$$= A\cos(\omega t - kx)$$

allgemein

$$\phi(x,t) = A\cos(\omega t - kx + \varphi)$$

Energiedichte

($\text{Dichte} \quad \rho = \frac{m}{V}$)

- Schwingung bei 0 von Masse m

$$E = \frac{1}{2} m v_{max}^2 = \frac{1}{2} m \omega^2 A^2$$

($v_{max} = \omega A$)

- kontinuierlich: viele dm's

$$dE = \frac{1}{2} dm\, \omega^2 A^2$$

- Energiedichte

$$w = \frac{dE}{dV} = \frac{1}{2} \frac{dm}{dV} \omega^2 A^2 = \frac{1}{2} \rho \omega^2 A^2$$

- Energiestromdichte

$$\boxed{S = \frac{dE}{dt \cdot dF} = \frac{dE}{\frac{ds}{c} \cdot dF} = c \frac{dE}{dV} = c\, w}$$

$$S = \frac{1}{2} c \rho \omega^2 A^2$$