Einheiten

Elektrisches und Magnetisches Feld

U_0	el. Urspannung	V	$\longleftrightarrow$	$\Theta = NI$	mag. Urspannung/Durchflutung	A
$E = -\frac{dU}{ds}$	Feldstärke	$\frac{V}{m}$	$\longleftrightarrow$	$H = \frac{dI}{dl}N$	Feldstärke	$\frac{A}{m}$
$U = -\int Eds$	Spannung	V	$\longleftrightarrow$	$\Theta = \int H(l)dl$	Spannung	A
$I = \frac{dQ}{dt}$	Stromstärke	A	$\longleftrightarrow$	$U = -N\frac{d\Phi}{dt}$	induz. Spannung	V
$Q = C \cdot U$	Ladung	As	$\longleftrightarrow$	$\Phi = \int BdA$	magn. Fluss	Vs
$D = \epsilon E$	Verschiebungsdichte	$\frac{As}{m^2}$	$\longleftrightarrow$	$B = \mu H = \frac{d\Phi}{dA_\perp}$	Flussdichte(Tesla)	$\frac{Vs}{m^2}$
$\epsilon = \epsilon_0\epsilon_r$	Permittivität	$\frac{As}{Vm}$	$\longleftrightarrow$	$\mu = \mu_0\mu_r$	Permeabilität	$\frac{Vs}{Am}$
$R = \frac{1}{\kappa}\frac{l}{A}$	Widerstand	Ω	$\longleftrightarrow$	$R_m = \frac{1}{\mu}\frac{l}{A} = \frac{\Theta}{\Phi}$	magn. Widerstand (Weber)	$\frac{A}{Wb}$
κ	el. Leitfähigkeit	$\frac{A}{Vm}$	$\longleftrightarrow$	μ	magn. Leitfähigkeit	$\frac{Wb}{Am}$
$C = \frac{Q}{U}$	Kapazität(Farad)	$\frac{As}{V}$	$\longleftrightarrow$	$L = -\frac{U}{\frac{dI}{dt}}$	Induktivität(Henry)	H
$F_{el} = EQ$	el. Kraft	N	$\longleftrightarrow$	$F_m = Q(v \times B)$	magn./Lorenz-Kraft	N
$W = \int uidt$	Arbeit		$\longleftrightarrow$	$\Psi = n\Phi$	verketteter Fluss	Vs

Translation und Rotation

s	Weg	m	$\longleftrightarrow$	φ	Winkel	rad
$v = \frac{ds}{dt}$	Geschwindigkeit	$\frac{m}{s}$	$\longleftrightarrow$	$\omega = \frac{d\phi}{dt}$	Winkelgeschwindigkeit	$\frac{rad}{s}$
$a = \frac{dv}{dt}$	Beschleunigung	$\frac{m}{s^2}$	$\longleftrightarrow$	$\alpha = \frac{d\omega}{dt}$	Winkelbeschleunigung	$\frac{rad}{s^2}$
m	Masse	kg	$\longleftrightarrow$	$J = \int r^2dm$	Massenträgheitsmoment	kgm^2
$F = ma = \frac{dp}{dt}$	Kraft	N	$\longleftrightarrow$	$M = r \times F$	Drehmoment	Nm
$p = mv$	Impuls	Ns	$\longleftrightarrow$	$L = J\omega$	Drehimpuls	$\frac{Nm}{s}$
$c = \lvert\frac{F}{s}\rvert$	Kraftkonstante	$\frac{N}{m}$	$\longleftrightarrow$	$c^* = \frac{M}{\phi}$	Winkelrichtgrösse	$\frac{Nm}{rad}$
$W = \int Fds$	Arbeit	J	$\longleftrightarrow$	$W = \int Md\phi$	Arbeit	Ws
$E_{kin}^{trans} = \frac{m}{2}v^2$	kinet. Energie	J	$\longleftrightarrow$	$E_{kin}^{rot} = \frac{J}{2}\omega^2$	kinet. Energie	J
$P = \frac{dW}{dt} = Fv$	Leistung	W	$\longleftrightarrow$	$P = M\omega$	Leistung	W

Units

Electric and Magnetic Field

U_0	electromotive force	V	$\longleftrightarrow$	$\Theta = NI$	magnetomotive force	A
$E = -\frac{dU}{ds}$	field strength	$\frac{V}{m}$	$\longleftrightarrow$	$H = \frac{dI}{dl}N$	field strength	$\frac{A}{m}$
$U = -\int Eds$	voltage	V	$\longleftrightarrow$	$\Theta = \int H(l)dl$	voltage	A
$I = \frac{dQ}{dt}$	current strength	A	$\longleftrightarrow$	$U = -N\frac{d\Phi}{dt}$	induced. voltage	V
$Q = C \cdot U$	charge	As	$\longleftrightarrow$	$\Phi = \int BdA$	magn. flow	Vs
$D = \epsilon E$	electric displacement	$\frac{As}{m^2}$	$\longleftrightarrow$	$B = \mu H = \frac{d\Phi}{dA_\perp}$	magn. flow density (Tesla)	$\frac{Vs}{m^2}$
$\epsilon = \epsilon_0\epsilon_r$	permittiviy	$\frac{As}{Vm}$	$\longleftrightarrow$	$\mu = \mu_0\mu_r$	permeability	$\frac{Vs}{Am}$
$R = \frac{1}{\kappa}\frac{l}{A}$	resistance	Ω	$\longleftrightarrow$	$R_m = \frac{1}{\mu}\frac{l}{A} = \frac{\Theta}{\Phi}$	magn. resistance (Weber)	$\frac{A}{Wb}$
κ	el. conductivity	$\frac{A}{Vm}$	$\longleftrightarrow$	μ	magn. conductivity	$\frac{Wb}{Am}$
$C = \frac{Q}{U}$	capacity (Farad)	$\frac{As}{V}$	$\longleftrightarrow$	$L = -\frac{U}{\frac{dI}{dt}}$	induktivity (Henry)	H
$F_{el} = EQ$	el. force	N	$\longleftrightarrow$	$F_m = Q(v \times B)$	magn. force / Lorenz-force	N
$W = \int uidt$	work		$\longleftrightarrow$	$\Psi = n\Phi$	chained flow	Vs

Translation and Rotation

s	trajectory	m	$\longleftrightarrow$	φ	angle	rad
$v = \frac{ds}{dt}$	speed	$\frac{m}{s}$	$\longleftrightarrow$	$\omega = \frac{d\phi}{dt}$	angular speed	$\frac{rad}{s}$
$a = \frac{dv}{dt}$	acceleration	$\frac{m}{s^2}$	$\longleftrightarrow$	$\alpha = \frac{d\omega}{dt}$	angular acceleration	$\frac{rad}{s^2}$
m	mass	kg	$\longleftrightarrow$	$J = \int r^2 dm$	moment of inertia	kgm^2
$F = ma = \frac{dp}{dt}$	force	N	$\longleftrightarrow$	$M = r \times F$	torque	Nm
$p = mv$	impulse	Ns	$\longleftrightarrow$	$L = J\omega$	angular momentum	$\frac{Nm}{s}$
$c = \lvert\frac{F}{s}\rvert$	force contant	$\frac{N}{m}$	$\longleftrightarrow$	$c^* = \frac{M}{\phi}$	torsion coefficient	$\frac{Nm}{rad}$
$W = \int Fds$	work	J	$\longleftrightarrow$	$W = \int Md\phi$	work	Ws
$E_{kin}^{trans} = \frac{m}{2}v^2$	kinet. energy	J	$\longleftrightarrow$	$E_{kin}^{rot} = \frac{J}{2}\omega^2$	kinet. energy	J
$P = \frac{dW}{dt} = Fv$	power	W	$\longleftrightarrow$	$P = M\omega$	power	W