

Chapter 12 – 15: UNITS

	MKS	CGS	US
Stress = σ (same for Y, S, and B)	$\frac{\text{N}}{\text{m}^2}$	$\frac{\text{dyne}}{\text{cm}^2}$	$\frac{\text{lb}}{\text{in}^2}$
Strain = ϵ	None	None	None
Force constant (or spring constant) = k	$\frac{\text{N}}{\text{m}}$	$\frac{\text{dyne}}{\text{cm}}$	$\frac{\text{lb}}{\text{ft}}$
Period = T	sec	sec	sec
Frequency = $f = \frac{1}{T}$	Hz $\left(= \frac{1}{\text{sec}} \right)$	Hz	Hz
Amplitude = A	m	cm	ft
Angular velocity (frequency) = $\omega = 2\pi f$	$\frac{\text{rad}}{\text{s}}$	$\frac{\text{rad}}{\text{s}}$	$\frac{\text{rad}}{\text{s}}$
Wavelength = λ	m	cm	ft
Wave number = $k = \frac{2\pi}{\lambda}$	$\frac{1}{\text{m}}$	$\frac{1}{\text{cm}}$	$\frac{1}{\text{ft}}$
Intensity = $\frac{E}{A t} = \frac{P_{\text{av}}}{A}$	$\frac{\text{W}}{\text{m}^2}$	$\frac{\text{erg}}{\text{s} \cdot \text{cm}^2}$	$\frac{\text{hp}}{\text{ft}^2}$
Intensity level = β	dB	dB	dB
Density = $\rho = \frac{M}{V}$	$\frac{\text{kg}}{\text{m}^3}$	$\frac{\text{g}}{\text{cm}^3}$	$\frac{\text{slug}}{\text{ft}^3}$
Pressure = $\frac{F_{\perp}}{A}$	Pa $\left(= \frac{\text{N}}{\text{m}^2} \right)$	$\frac{\text{dyne}}{\text{cm}^2}$	$\frac{\text{lb}}{\text{in}^2}$
Volume flow rate $= J = \frac{\Delta V}{\Delta t} = A v$	$\frac{\text{m}^3}{\text{s}}$	$\frac{\text{cm}^3}{\text{s}}$	$\frac{\text{ft}^3}{\text{s}}$

Some pressure conversions: (Hg = Mercury)

$$\begin{aligned}
 1 \text{ atm} &= 101,300 \text{ Pa} = 14.70 \text{ lb/in}^2 & 1 \text{ torr (=1 mm Hg)} &= 133.3 \text{ Pa} \\
 1 \text{ inch Hg} &= 3386 \text{ Pa} & 1 \text{ inch water} &= 249.1 \text{ Pa} \\
 1 \text{ lb/in}^2 &= 6895 \text{ Pa} & 1 \text{ mbar} &= 100 \text{ Pa}
 \end{aligned}$$