# GELOMBANG BUNYI

***GETARAN***

1. $k = \frac{w}{x}$
2. $F = - k \, . \, y$
3. $Ep = ½ \, ky^2$
4. $E\,mek = ½ \, kA^2$
5. $Ek = ½ \, k \, (A^2 - y^2)$
6. $v = \sqrt{\frac{k(A^2 - y^2)}{m}}$
7. $k = m\omega^2$
8. $y = A\sin\omega t$
9. $v = \omega A\cos\omega t$
10. $a = -\omega^2 A\sin\omega t$
11. $Ek = ½ m\omega^2 A^2 \cos^2 \omega t$
12. $Ep = ½ m\omega^2 A^2 \sin^2 \omega t$
13. $E\,mek = ½ m\omega^2 A^2$

k = konstanta pegas
W = berat
x = perubahan panjang pegas
F = gaya pegas
y = simpangan
Ep = energi potensial
Emek = energi mekanik
Ek = energi kinetik
A = amplitudo
t = waktu
ω = kecepatan sudut
m = massa
T = periode
k = konstanta
l = panjang
f = frekuensi
λ = panjang gelombang
Lo = panjang mula-mula
ΔL = perubahan panjang
n = nada dasar ke
Vp = kecepatan pendengar
Vs = kecepatan sumber bunyi
P = daya
$R_1$= jarak 1
$R_2$ = jarak 2

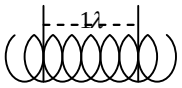
14. $T = 2\pi\sqrt{\frac{m}{k}}$

15. $T = 2\pi\sqrt{\frac{l}{g}}$

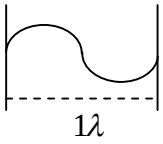
***GELOMBANG***

Gelombang
- mekanik
  - refleksi
  - refraksi
  - interferensi
  - defraksi
  - polarisasi

  } gel. longitudinal




  } gel. transversal




- elektromagnetik

1. $v = f \cdot \lambda \rightarrow \lambda = v \cdot t$

2. $y$ gel. berjalan $= A\sin 2\pi\left(\frac{t}{T} - \frac{x}{\lambda}\right)$

3. $y$ diam $\longrightarrow$ ujung bebas $\longrightarrow$ $\Delta\varphi = 0$

   $y = 2A\cos 2\pi\frac{x}{\lambda}\sin 2\pi\left(\frac{t}{T} - \frac{L}{\lambda}\right)$

4. $y$ diam $\longrightarrow$ ujung terikat $\longrightarrow$ $\Delta\varphi = \frac{1}{2}$

   $y = 2A\sin 2\pi\frac{x}{\lambda}\cos 2\pi\left(\frac{t}{T} - \frac{L}{\lambda}\right)$

5. $v = \sqrt{\frac{F}{\mu}} \longrightarrow \mu = \frac{m}{\ell}$

6. $v = \sqrt{\frac{E}{\rho}}$

$E$ = modulus young

$E = \frac{\text{stress}}{\text{strain}} = \frac{P}{\varepsilon} = \frac{F/A}{\Delta L/Lo} = \frac{F \cdot Lo}{A \cdot \Delta L}$

7. $v \text{ gas} = \sqrt{\gamma \frac{P}{\rho}}$

$= \sqrt{\gamma \frac{RT}{M}} \longrightarrow \gamma = \frac{Cp}{Cv}$

**BUNYI** → Gelombang Longitudinal

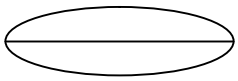
Bunyi → nada / desah
- > 20.000 Hz (Ultrasonic)
- 20 Hz – 20.000 Hz
- < 20 Hz (Infrasonic)

keras / lemah tergantung Amplitudo

tinggi/rendah tergantung Frekuensi

Nada → Sumber

1. Dawai



*ND*

$(n+1)P$, $(n+2)s$ → $f_n = \frac{n+1}{2L} v$

2 Pipa Organa Terbuka

$(n+2)P$, $(n+1)s$ → $f_n = \frac{n+1}{2L} v$

3. Pipa Organa Tertutup

$(n+1)P$, $(n+1)s$ → $f_n = \frac{2n+1}{4L} v$

Sifat :

- Refleksi (Pemantulan)

$$d = \frac{v.tpp}{2}$$

- Resonansi

$$ln = (2n-1)\frac{1}{4}\lambda$$

- Interferensi (Percobaan Quinke)
  - memperkuat $n\lambda$
  - memperlemah $(n+1)\frac{1}{2}\lambda$

- Pelayangan (beat) ⟶ Beat

$$\text{f layangan} = |f_A - f_B|$$

- Efek Doppler

$$f_P = \frac{v \pm v_P}{v \pm v_s} \cdot f_s$$

- Intensitas

$$I = \frac{P}{A} = \frac{P}{4\pi R^2}$$

$$I_1 : I_2 = \frac{1}{R_1^{\,2}} : \frac{1}{R_2^{\,2}}$$

- Taraf Intensitas (*TI*)

$$TI = 10 \log \frac{I}{I_0}$$

dB

$$I_0 = 10^{-12} \ \text{Watt}/\text{m}^2$$