- **Speed of Longitudinal wave in gaseous medium** $v_{gas} = \sqrt{\frac{\gamma P}{\rho}} = \sqrt{\frac{\gamma RT}{M_w}}$

- **Speed of transverse wave** $v = \sqrt{\frac{T}{m}} = \sqrt{\frac{T}{\pi r^2 \rho}}$

- In super position of two coherent waves of intensity I_1 and I_2

  - Resultant intensity $I = I_1 + I_2 + 2\sqrt{I_1}\sqrt{I_2}\cos\phi$

  - Resultant amplitude $A = \sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos\phi}$

  - For constructive interference

    $\Delta\phi = 2\pi n$, $\Delta x = n\lambda$, $I_{max} = I_1 + I_2 + 2\sqrt{I_1 I_2} = (\sqrt{I_1} + \sqrt{I_2})^2$

  - For destructive interference

    $\Delta\phi = (2n-1)\pi$, $\Delta x = (2n-1)\lambda/2$, $I_{min} = I_1 + I_2 - 2\sqrt{I_1 I_2} = (\sqrt{I_1} - \sqrt{I_2})^2$

- **Degree of hearing** $= \frac{I_{max} - I_{min}}{I_{max} + I_{min}} \times 100$

- **Beats frequency** $= n_1 \sim n_2$

- **Closed organ pipe**

  - Fundamental frequency $= \frac{v}{4\ell}$

  - Frequency of m^{th} overtone $= (2m + 1)\frac{v}{4\ell}$

- **Open organ pipe**
  - Fundamental frequency $= \frac{v}{2\ell}$

  - Frequency of m^{th} overtone $= (m + 1)\frac{v}{2\ell}$