

# Ondas de sonido en un tubo.

## Ecuación de ondas

$$\frac{\partial^2 \psi(x,t)}{\partial t^2} = c^2 \frac{\partial^2 \psi(x,t)}{\partial x^2} \quad c^2 = \frac{\gamma P_o}{\rho_o}$$

$$\frac{\partial^2 P_s(x,t)}{\partial t^2} = c^2 \frac{\partial^2 P_s(x,t)}{\partial x^2}$$

$$\frac{\partial^2 \rho_s(x,t)}{\partial t^2} = c^2 \frac{\partial^2 \rho_s(x,t)}{\partial x^2}$$

$$\rho_s = -\rho_o \frac{\partial \psi}{\partial x}$$

$$P_s = -\gamma P_o \frac{\partial \psi}{\partial x}$$

**Sabiendo que:**

$$P = P_o + P_s$$

$$\rho = \rho_o + \rho_s$$