# Problema n° 8. Ondas sobre cuerdas

Demostrar que $y = \ln\left[A(x-v t)\right]$ es una solución de la ecuación de onda de D'Alembert con $A =$ cte.-

(1) $$\left(\frac{\mu}{F}\right)\frac{\partial^2 y}{\partial t^2} = \frac{\partial^2 y}{\partial x^2}$$ pero $v = \sqrt{\frac{F}{\mu}} \rightarrow v^2 = \frac{F}{\mu}$

$\frac{\mu}{F} = \frac{1}{v^2}$

$$\frac{\partial y}{\partial x} = \frac{1}{\cancel{A}(x-vt)} \cdot \cancel{A} = \frac{1}{(x-vt)}$$

$$\frac{\partial^2 y}{\partial x^2} = \frac{0(x-vt) - 1(1)}{(x-vt)^2} = -\frac{1}{(x-vt)^2}$$

$$\frac{\partial y}{\partial t} = \frac{1}{A(x-vt)} \cdot A(-v) = -\frac{\cancel{A}v}{\cancel{A}(x-vt)} = -\frac{v}{(x-vt)}$$

$$\frac{\partial^2 y}{\partial t^2} = -\frac{0(x-vt) - v(-v)}{(x-vt)^2} = \frac{0 + v^2}{(x-vt)^2} = -\frac{v^2}{(x-vt)^2}$$

en (1) $$\left(\frac{1}{\cancel{v^2}}\right)\left(-\frac{\cancel{v^2}}{(x-vt)^2}\right) = -\frac{1}{(x-vt)^2}$$

$$-\frac{1}{(x-vt)^2} = -\frac{1}{(x-vt)^2}$$ verifica.