One Dimensional Wave Equation

Vibrating String =>

The one dimensional wave equation arises in the study of transverse vibrations of an elastic string or torsional oscillations or longtiudinal vibrations of a rod.

Here consider an elastic string stretched to its length L and placed along the x-axis with its two ends $x=0$ and $x=L$ fixed.

Let the function $u(x,t)$ denote the deflection of string at any point x at any time $t > 0$ from the equilibrium position x-axis. When the string is distorted then it vibrates in one dimension (along y-axis) and the equation of this one-dimensional wave equ is represented as

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$$