

Wave of one characteristic

I. $u(x,t)$

Information is a function of space and time.

Information can be wave height, displacement, acoustic pressure, \dots .

II. Governing equation:

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial t} = 0$$

III. Initial condition:

$$u(x, 0) = f(x)$$

IV. Solution

$$u(x, t) = f(x - t)$$

V. The signal(information) at (x, t) will be present again at $(x + \Delta x, t + \Delta t)$.