is not necessarily straight forward. We have never encountered the problem of matter waves before, and we can only guess at the type of equation that will successfully describe their properties. The validity of our ultimate choice can be known only by the results we obtain.

WAVE MOTION :

[R.P.5]

$$\frac{\partial^2 y}{dx^2} = \frac{1}{u^2}\frac{\partial^2 y}{dt^2}$$

$$y = f(x - ut)$$

$$y = g(x + ut)$$

Standing waves :

$$n \times \frac{\lambda}{2} = l$$

$$y = f_1(x) f_2(t)$$

$$f_2(t) = A\sin 2\pi\nu t$$

$$y = f_1(x) A \sin 2\pi\nu t$$

$$\frac{dy}{dt} = f_1(x) . 2\pi\nu A \cos 2\pi\nu t$$

$$\frac{\partial^2 y}{dt^2} = -4\pi^2\nu^2 f_1(x) . A \sin 2\pi\nu t$$

$$= -4\pi^2\nu^2 f_1(x) . f_2(t)$$

$$\frac{\partial^2 y}{dx^2} = \frac{1}{u^2} \cdot \frac{d^2 y}{dt^2}$$

$$\frac{d^2 y}{dx^2} = -\frac{4\pi^2\nu^2}{u^2} f_1(x) f_2(t)$$