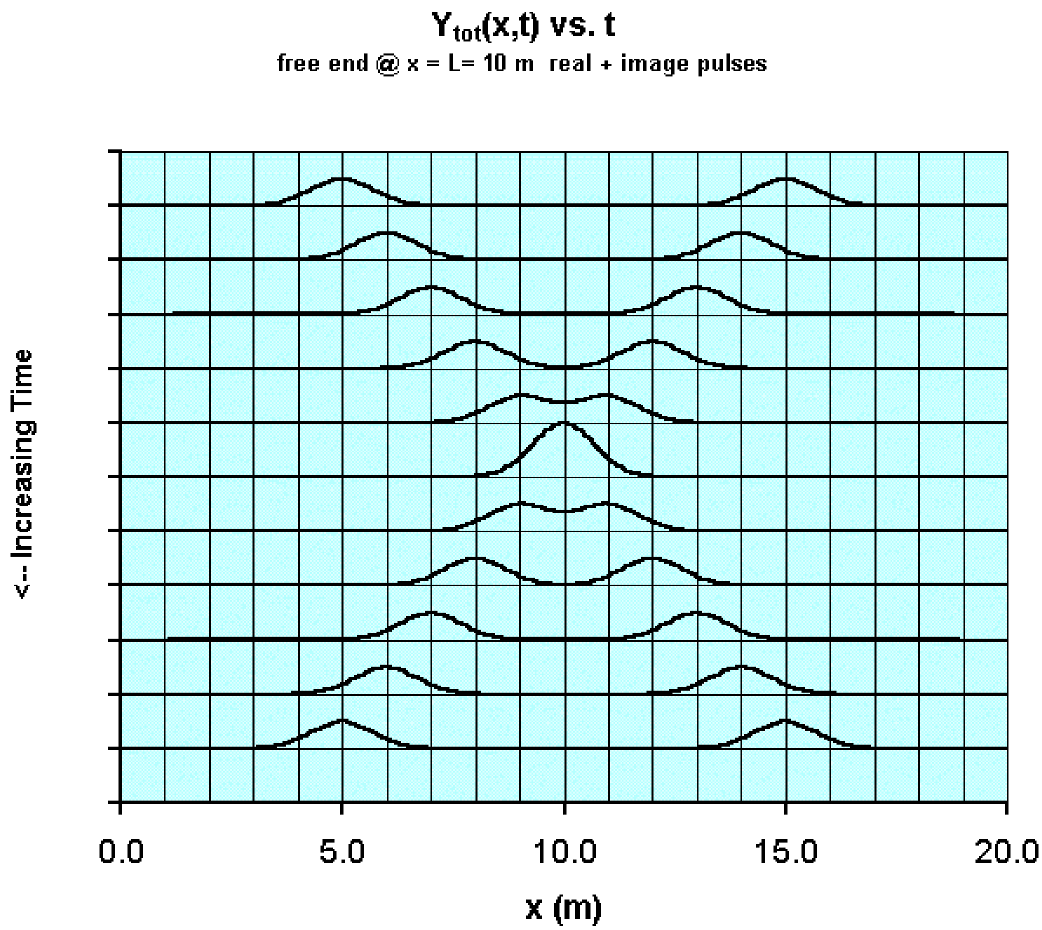
As time progresses, the two pulses move closer and closer to each other, *passing through* each other at $x = L$, and then keep on going. During the time that the two pulses overlap each other, the overall transverse displacement of the string at $x = L$ is just the *linear superposition* of the two waves, *i.e.*

$$y_{tot}(x=L,\, t) = y_{right}(x=L,\, t) + y_{left}(x=L,\, t) = y_o \exp\{-(L-v_x t)^2\} + y_o \exp\{-(-L+v_x t)^2\}$$

In general, for *any* point x, and time t, we will have, for reflection at a fixed end:

$$y_{tot}(x,\, t) = y_{right}(x,\, t) + y_{left}(x,\, t) = y_o \exp\{-(x-v_x t)^2\} + y_o \exp\{-[(x-2L)+v_x t]^2\}$$

In the figure below, note that the slope, $\partial y_{tot}(x=L,t)/\partial x$ *is* always zero for reflection of a right-moving traveling wave from a free end, located at $x = L = 10\ m$.



One comment here is that wave reflection of any kind, from an end support, or arising from a discontinuity in the propagation medium (*e.g*, a sudden "jump" in the mass per unit length, μ of a string, or *e.g*. the sudden change in sound waves propagating in the body and/or neck wood of a guitar, due to encountering the layer(s) of paint and/or lacquer on the guitar's outer surfaces), is a macroscopic form of a <u>*scattering process*</u>. The above snapshot time sequences really show this quite clearly, at least to a particle-physicist's eye! At the atomic level, a very great many atoms of the medium (typically ~