

Electricity and Magnetism II (PHY 322)

Function Animation Homework

This homework is all about animating functions of x and t , such as

$$f(x, t) = \cos(kx - \omega t)$$

for fixed values of k and ω . We plot f as a function of x and allow that image to change over time. Download the file `AnimateFunction.hs` from the course website.

Problem 1 (4 points) The file `AnimateFunction.hs` has an example of a traveling wave propagating in the positive x direction. Make an animation of a traveling wave propagating in the negative x direction.

Problem 2 (4 points) Do you think the following function is a standing wave?

$$f(x, t) = \cos(kx - \omega t) + \sin(kx - \omega t)$$

Animate the function and find out. You can pick any values for k and ω that you want to. If it is a standing wave, where are the nodes?

Problem 3 (4 points) We have learned that a traveling wave in the positive x direction plus a traveling wave in the negative x direction can make a standing wave. Animate a wave that is a sum of a traveling wave in the positive x direction and a traveling wave in the negative x direction where the two traveling waves have *different* amplitudes. Is the result a standing wave? Describe in words what the animation looks like.

Problem 4 (4 points) Choose a function of one variable that you like; let's call it $g(x)$. Pick a function that you think has a low probability of being chosen by one of your classmates. Animate the function

$$f(x, t) = g(x - t).$$

Describe in words what this animation looks like. What do you expect that an animation of

$$h(x, t) = g(x + t)$$

would look like?