

PHY 711 – Problem Set # 14

Start reading Chapter 7 in **Fetter and Walecka**.

Suppose that an infinite continuous string satisfies the wave equation:

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}. \quad (1)$$

Find $u(x, t)$ for the following initial conditions:

1.
$$u(x, 0) = 0 \quad \frac{\partial u}{\partial t}(x, 0) = \frac{2Ax}{(x^2 + a^2)^4}, \quad (2)$$

where A and a are positive constants.

2.
$$u(x, 0) = \frac{A}{(x^2 + a^2)^2} \quad \frac{\partial u}{\partial t}(x, 0) = 0, \quad (3)$$

where A and a are positive constants.

You can visualize your results using the animate feature of Maple. For example, to animate the result we obtained in class today, you can use the following syntax:

```
> with(plots);  
> animate(plot, [exp(-(x+t)^2)+exp(-(x-t)^2), x = -30 .. 30], t = 0 .. 20);
```