The Wave Problem.....

The ***Wave Equation*** is

$$u_{tt} = c(u_{xx} + u_{yy})$$

where c is a constant and u=u(t,x,y). This equation can be modeled discretely using finite differences as:

$$u_{t+1,x,y} = 2(1 - 2\rho^2)u_{t,x,y} + \rho^2(u_{t,x+1,y} + u_{t,x-1,y} + u_{t,x,y-1} + u_{t,x,y-1}) - u_{t-1,x,y}$$

where $\rho = \Delta t / h$, Δt is the time step in the time direction, and h is the step size in the x and y directions.

Calculating the new value of u at time t+1 requires only the value of u at times t and $t-1$. So, only two time steps are needed to be stored in memory simultaneously.