Physics 640
September 27, 2007

Write a Matlab code to read in the output file; then plot; then grab frames to make a movies file

```
%Code to read in output file from prop.f and visualize the wave
propagation
%in 1D
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clear all;
close all;

load prop.prb;  % This loads the content of prop.prb on to memory

% Make file reading into 2D array
%  Now you need to reallocate that 1D series of nx*(nn+1) into a 2D array called fx

        nx=100; %This is your number of spatial points
        nn=80;  %This is your number of temporal iterations
        ct = 1;
        fx = zeros(nx,nn+1);
        for k= 1:nn+1
              for i = 1:nx
                    fx(i,k) = prop(ct); %Replace 'prop' by your file name
                    ct = ct + 1;
              end;
        end;

%Movies

frname='prop1D.avi';
avi=avifile(frname,'compression','none');
for j = 1:nn+1
plot(fx(:,j)), axis([0 100 0 10])
        Fb = getframe;
        avi = addframe(avi,Fb);
        clear Fb;
end;
avi=close(avi);
```

I have 'NaN' in the output file starting from some iteration.
Please make sure the coefficient in the propagation algorithm is $(c*\delta t/\delta x)**2$, and that $\delta t= \delta x/c$. Also make sure the center of the Gaussian is not exactly on or too close to the boundary.

Matlab file brought up some blank Figure

We set the vertical axis scale between 0 and 10 in the Matlab file, if your numbers are too small, we can't see.

When I change the vertical axis scale to between 0 and 0.01 I can see something that disappears quickly
Check if the propagation algorithm was initiated a sufficient number of time iterations.

$$F^{n+1}(i) = 2F^{n}(i) - F^{n-1}(i) + \left(\frac{c\delta t}{\delta}\right)^{2}\left[F^{n}(i+1) + F^{n}(i-1) - 2F^{n}(i)\right]$$

This algorithm requires initialization at 2 previous time iterations!

```
*    initialization
     do 30 i=1,nx
         fx(i,1)=100./(sqrt(2.*pi)*sigma)*exp(-(i-(ibar))**2/(2.*var))
         fx(i,2)=100./(sqrt(2.*pi)*sigma)*exp(-(i-(ibar+1))**2/(2.*var))
30   continue
```

I still get NaN's even after proper initialization
Make sure the propagation algorithm is not making use of points that have not been defined