```
%% %%%% dispersion.m
clear
clf
% %%%% computational models of dispersion
%% geometry, x and k
        Nfft=8192;
        L=4.0;
        x=linspace(-L,L,Nfft)';
        x2=x.*x;
        delx=x(2)-x(1);
        k=2*pi*(0:Nfft-1)'/delx;
%% initial profile
        c=1.0;                  % velocity
        Wx=0.1;                 % width
        alpha0=-0.00001;        % dispersion coefficient
        alpha=delx*delx*alpha0;
        WxWx=Wx*Wx;
        Aofx=exp(-x2/WxWx/2);   % profile A(x,0)
%% norm Aofx
        Aofx=Aofx/sum(Aofx)/delx; % A(x,0) properly normed
        Amax=max(Aofx);           % used in figure(1) plot limits
        Aofk=fft(Aofx,Nfft);      % A(k,0)
%% choose values of t
        NT=25; % number of moments of time
        tvec=0.0020*delx*linspace(0,500,NT);
%% address of Fourier components
        n1=(2:Nfft/2)';         % address of basic Fourier components
        n2=(2+Nfft/2:Nfft)';    % address of their complex conjugate
        n3=flipud(n1);
%%  time evolution
for ii=1:NT
        t=tvec(ii);
        %%%%%% time evolution
        k1=k(n1);
        k2=k(n3);
        kappa1=k1.*(1-alpha*k1.*k1);
        kappa2=k2.*(1-alpha*k2.*k2);
        E1=exp(-i*kappa1*t);
        E2=exp(+i*kappa2*t);
        Eoft=[1;E1;1;E2];   % k = 0 and k = pi are unchanged
        Ak=Aofk.*Eoft;      % Fourier transform at time t, A(k,t)=A(k,0)E(k,t)
        Ax=ifft(Ak,Nfft);   % A(x,t)
        % plot $A(x,t) vs x, use temporary pause for "movie"
        figure(1)
        plot(x,Ax)
        axis([-L L -Amax Amax])
        pause(0.5)
end
        hold on
%% plot initial profile on last A(x,t_last)
        plot(x,Aofx,'r.')
        xlabel('x','Fontsize',20)
        ylabel('A(x,t)','Fontsize',20)
        grid
```