APPENDIX-I

MEASUREMENT OF TSUNAMI FAULT PARAMETERS

```
%% Tsunami parameters calculations
% Defining of input parameters
% Fault Length Estimation
clc;
clear all;
close all;

M=6.0:.5:9.5; % Tsunami magnitude impact range
 %% Papazachos et.al model for the fault region estimation
X=(0.55.*M-2.19); % Logarithmic scale length
Y=0.31.*M-0.63;% Logritmic scale width
A=0.86.*M-2.82; % Log scale area
D=0.64.*M-2.78; % Log scale displacement
 fault_length = transpose (10.^X);
fault_width = transpose (10.^Y);
fault_area = transpose (10.^A);
fault_displacement = transpose (10.^D);
M = transpose(M);
 % Data export to the file
% xlswrite('Fault Length.xls',(fault_length));
% xlswrite('Fault Width.xls',  (fault_width));
% xlswrite('Fault Area.xls',  (fault_area));
% xlswrite('Fault Displacement.xls', (fault_displacement));
% xlswrite('Moment_magnitude.xls', (M));
 % filename = 'Tsunami Fault Parameters.xlsx';
% data = {'M','L','W','A','D';
M(:,1:8),fault_length(:,1:8),fault_width(:,1:8),fault_area(:,1:8),fault_displacement(:,1:8)};
% sheet = 5;
% xlRange = 'E1';
% xlswrite(filename,data,sheet,xlRange)

figure (1)

subplot (4,1,1)

plot(M,10.^X,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
xlabel ('Earthquake Magnitude (\itM)');
ylabel ('\itl (Km');
grid on;
```

```
title ('Fault Parameters')


subplot (4,1,2)
plot(M,10.^Y,'-gs','LineWidth',2,...
              'MarkerEdgeColor','k',...
              'MarkerFaceColor','b',...
              'MarkerSize',5);
xlabel ('Earthquake Magnitude (\itM)');
ylabel ('\itW(Km)');
grid on;

subplot (4,1,3);
plot(M,10.^A,'-bs','LineWidth',2,...
              'MarkerEdgeColor','k',...
              'MarkerFaceColor','r',...
              'MarkerSize',5);
xlabel ('Earthquake Magnitude (\itM)');
ylabel ('\itA(Km^2)');
grid on;

subplot (4,1,4)
plot(M,10.^D,'-ks','LineWidth',2,...
              'MarkerEdgeColor','k',...
              'MarkerFaceColor','y',...
              'MarkerSize',5);

xlabel ('Earthquake Magnitude (\itM)');
ylabel ('\itD (Cm)');
grid on;
```

APPENDIX-II

COMPUTATIONAL AND ALGORITHMIC ANALYSIS OF TSUNAMI WAVE PARAMETERS

```
%Airy Wave theory simulation
% Estimation of wave number for deep water condition
clc;
clear all;
close all;
% input data condition
d_deep = [8000 8200 8400 8600 8800 9000 9200 9400 9600 9800 ];
d_inter=[5200 5400 5600 5800 6000 6200 6400 6600 6800 7000];
d_shallow =[10 100 200 300 400 500 600 700 800 900];

% Corresponding Wavelengths estimation
L_deep = 2.*d_deep;
L_inter = 1.8*d_inter;
L_shallow = .9.*d_shallow;

% L_deep= [500 1000 2000 3000 4000 5000 6000 7000 8000 9000];
% L_inter= [10 20 30 40 50 60 70 80 90 100];
% L_shallow = [1 2 3 4 5 6 7 8 9 10];

x_deep= 0:(5.*L_deep)./9:(5.*L_deep);
x_inter= x_deep;
x_shallow= x_deep;

% x_inter = 5.*L_inter;

% x_shallow = 5.*L_shallow;

H1=3;
H2 = 6;
H3 = 10;
a1=H1/2;
a2 = H2/2;
a3 = H3/2;
t=0:(60*60*10)./9:(60*60*10);
pi=3.14;
g=9.81;
k_deep=2*pi./L_deep;
k_inter=2*pi./L_inter;
k_shallow=2*pi./L_shallow;
omega_deep=sqrt (g.*k_deep);
```

```
omega_inter=sqrt (g.*k_inter.*tanh (k_inter.*d_inter));
omega_shallow = sqrt (g.*d_shallow);

% datasets = {'Deep_water','Inter_water','Shallow_water'; d_deep, d_inter,d_shallow};
% s = xlswrite('tempdata.xls', datasets, 'waterdepth', 'E1');

% % %% Wave profile
% eta_deep = a1.*cos (k_deep.*x_deep-omega_deep.*t);
% eta_inter = a2.*cos (k_inter.*x_inter-omega_inter.*t);
% eta_shallow = a3.*cos (k_shallow.*x_shallow-omega_shallow.*t);%
% figure
% plot (omega_deep, eta_deep,'-r','LineWidth',1.5); xlabel ('x(km)'); ylabel ('\eta');
% hold on
% plot (omega_inter, eta_inter,'-g','LineWidth',1.5); xlabel ('x(km)'); ylabel ('\eta');
% hold on
% plot (omega_shallow, eta_shallow,'-b','LineWidth',1.5); xlabel ('x(km)'); ylabel ('\eta');
% grid on
%% Wavelength Plot
if (1)
%%PLot for Water wave angular frequencies in deep, intermediate and shallow
if (1)
figure (1);
subplot (3,1,1)
plot(L_deep,omega_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
xlabel ('\itL (m)'); ylabel ('\omega (rad/s)');
title ('Deep water angular frequency');
grid on

subplot (3,1,2)
plot(L_inter,omega_inter,'-gs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','b',...
                'MarkerSize',5);
xlabel ('\itL (m)'); ylabel ('\omega (rad/s)');
title ('Intermediate water angular frequency');
grid on

subplot (3,1,3)
plot(L_shallow,omega_shallow,'-bs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','k',...
                'MarkerSize',5);
xlabel ('\itL (m)'); ylabel ('\omega (rad/s)');
```

```
title ('Shallow water angular frequency');
grid on
end
end
if (1)
%% Plot for wave numbers
figure (2);
subplot (3,1,1)
plot(k_deep,omega_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
xlabel ('\itk (m^-1)');
ylabel ('\omega (rad/s)');
title ('Deep water angular wave number');
grid on

subplot (3,1,2)
plot(k_inter,omega_inter,'-gs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','b',...
                'MarkerSize',5);
xlabel ('\itk (m^-1)');
ylabel ('\omega (rad/s)');
title ('Intermediate water angular wave number');
grid on

subplot (3,1,3)
plot(k_shallow,omega_shallow,'-bs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','k',...
                'MarkerSize',5);
xlabel ('\itk (m^-1)');
ylabel ('\omega (rad/s)');
title ('Shallow water angular wave number');
grid on
end

if (1)
% wave charecterstics calculation

for i=d_deep (1:10);
   z_deep = 0:i (:,1)/9:i (:,1);
     for j = d_inter (1:10);
      z_inter = 0:j (:,1)/9:j (:,1);
      for k = d_shallow (1:10);
```

```
        z_shallow =0:k (:,1)/9:k (:,1);

%    disp (z_shallow);
%    disp (z_inter);
%    disp (z_deep);

% % z_deep = 0:-d_deep(:,1:10)./9: -d_deep;
% z_inter = 0:-d_inter./9: -d_inter;
% z_shallow = 0:-d_shallow./9:-d_shallow;

% Wave potential Calculation
phi_deep = g*a1.*exp (-k_deep.*z_deep).*cos ((omega_deep.*t)-(k_deep.*x_deep));
phi_inter = g*a2.*cosh(k_inter.*z_inter+k_inter.*d_inter).*cos (omega_inter.*t-
k_inter.*x_inter)./(omega_inter.*cosh(k_inter.*d_inter));
phi_shallow = (g*a3.*cos((omega_shallow.*t)-(k_shallow.*x_shallow))./(omega_shallow));

% Deep Water Wave charecterstics calculations
u_x_deep = omega_deep*a1.*exp (-k_deep.*z_deep).*sin ((omega_deep.*t)-(k_deep.*x_deep));
u_z_deep = omega_deep*a1.*exp (-k_deep.*z_deep).*cos ((omega_deep.*t)-(k_deep.*x_deep));
a_x_deep = omega_deep.^2.*a1.*exp (-k_deep.*z_deep).*cos ((omega_deep.*t)-
(k_deep.*x_deep));
a_z_deep = -omega_deep.^2.*a1.*exp (-k_deep.*z_deep).*sin ((omega_deep.*t)-
(k_deep.*x_deep));
u_res_deep = sqrt(u_x_deep.^2+u_z_deep.^2);
a_res_deep = sqrt(a_x_deep.^2+a_z_deep.^2);

%% Celerity estimation
c_deep = sqrt (g.*L_deep./2*pi);
c_inter = sqrt (((g.*L_inter./2*pi).*tanh (2*pi*d_inter./L_inter)));
c_shallow = sqrt (g.*d_deep);

%% Intermediate water wave charectertics calculations
u_x_inter = (omega_inter*a2.*cosh(k_inter.*z_inter+k_inter.*d_inter).*cos (omega_inter.*t-
k_inter.*x_inter))./sinh (k_inter.*d_inter);
u_z_inter = omega_inter*a2.*sinh(k_inter.*z_inter+k_inter.*d_inter).*sin (omega_inter.*t-
k_inter.*x_inter)./sinh (k_inter.*d_inter);

a_x_inter = omega_inter.^2.*a2.*cosh(k_inter.*z_inter+k_inter.*d_inter).*cos (omega_inter.*t-
k_inter.*x_inter)./sinh (k_inter.*d_inter);
a_z_inter = omega_inter.^2.*a2.*sinh(k_inter.*z_inter+k_inter.*d_inter).*sin (omega_inter.*t-
k_inter.*x_inter)./sinh (k_inter.*d_inter);

u_res_inter = sqrt(u_x_inter.^2+u_z_inter.^2);
a_res_inter = sqrt(a_x_inter.^2+a_z_inter.^2);

% Shallow water wave calculation
```

```
u_x_shallow= -(omega_shallow*a3.*sin (omega_shallow.*t-
k_shallow.*x_shallow))./(g.*d_shallow);
u_z_shallow= (omega_shallow.*a3.*cos (omega_shallow.*t-
k_shallow.*x_shallow)).*(d_shallow+z_shallow)./(d_shallow);

a_x_shallow= (omega_shallow.^2.*a3.*cos (omega_shallow.*t-
k_shallow.*x_shallow))./(k_shallow.*d_shallow);
a_z_shallow= -(omega_shallow.^2.*a3.*(d_shallow+z_shallow).*sin (omega_shallow.*t-
k_shallow.*x_shallow))./d_shallow;

u_res_shallow = sqrt(u_x_shallow.^2+u_z_shallow.^2);
a_res_shallow = sqrt(a_x_shallow.^2+a_z_shallow.^2);
      end
     end
end


% Standard theoratical Model values (Ward SN, 2002)
% Deep water
phi_deep_model_1= [   10.72   -7.56    3.45    1.25   -.986   0.0202 .990    0.112    0.112
0.2000];
u_x_deep_model_1=[0 .005 .009 -.020 -.010 -.009 -.006 -.004 -.003 .001];
u_z_deep_model_1= [0.073   -0.04    0.02    0.0001   -0.010    0.00009 0.0040    0.0010    0.0010
0.0012];
a_x_deep_model_1 = [ 0.067   -0.038    0.0026    0.001   -0.0017    0.0000 0.0024    0.0002
0.0002    0.0001];
a_z_deep_model_1=[ 0   -0.0037   -0.0004    0.0030    0.0019    0.0018   -0.0023    0.0024
0.0043   -0.0022];
a_r_deep_model_1= sqrt(a_x_deep_model_1.^2+a_z_deep_model_1.^2);
u_r_deep_model_1= sqrt(u_x_deep_model_1.^2+u_z_deep_model_1.^2);
c_deep_model_1= [  400.4143  300.5812  450.6733  500.6933  515.6438  475.5269 520.3451
515.1003  550.7947  560.4300];


% Intermediate water
phi_inter_model_1= [   360.76 -100.98 -405.67 1500.00 1489.00  -1087.98 -4800.89 -5200.98
4487.98 12000.00];
u_x_inter_model_1=[ 0.20   -0.0400   -0.10    0.65    0.60   -0.30 -1.00   -1.56   1.578    4.908];
u_z_inter_model_1= [ 0   -0.256   -0.30    0.05   -.0753    .89182    0.56    1.6855    3.6597   -
2.3766];
a_x_inter_model_1 = [ 0.02   -0.0156   -0.0120    0.0600    0.0556   -0.0400 -0.295   -0.297
0.160    0.308];
a_z_inter_model_1=[  0.1   -0.0409   -0.0500    0.0120   -0.0700    0.128  0.708    0.200    0.339
-0.340];
u_r_inter_model_1= sqrt(u_x_inter_model_1.^2+u_z_inter_model_1.^2);
a_r_inter_model_1= sqrt(a_x_inter_model_1.^2+a_z_inter_model_1.^2);
```

```
c_inter_model_1= [  400.3301  350.5561  370.6495  390.6173  400.4659  420.2013   412.8290
400.3539  412.7806  450.1135];

% Shallo Water Velocities
phi_shallow_model_1= [   5.15 .567 .089 .988 -.897 .766 .456 -.200 .678 .045];
u_x_shallow_model_1=[ 0    0.10    0.09   -0.0022   -0.015    0.057  -0.037   -0.036   -0.009   -
0.035];
u_z_shallow_model_1=[ 45.5227   80.2116   09.2766  400.3172 -500.9310  400.8919   450.5482
-230.2381  800.0059   80.7004];
a_x_shallow_model_1 =[69.29 220.22 37.89 1995.89 -2449.90 2290.98 2812.78 -1552.12
5400.89 616.59];
 a_z_shallow_model_1=[  0 9300.58 19600.592 -9600.56 -19564.45 38167.78 -45000.98 -
65467.89 -20456.67 -87000.67];
u_r_shallow_model_1=sqrt(u_x_shallow_model_1.^2+u_z_shallow_model_1.^2);
a_r_shallow_model_1= sqrt(a_x_shallow_model_1.^2+a_z_shallow_model_1.^2);
c_shallow_model_1= [   270.1428  280.6230  285.0610  300.4583  280.8163 290.1363  287.4197
300.6676  310.8811  300.0613];

%% Tsunami Eigen Function (Velocity) PLot for Deep water
figure (3)
subplot (3,1,1)
plot(d_deep,u_x_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
hold on
plot (d_deep,u_x_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);

xlabel ('\itd (m)');
ylabel ('\itu_x (m/s)');
grid on
title ('Eigen function distribution (velocity) for deep water waves')

subplot (3,1,2)
plot(d_deep,u_z_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
hold on
plot (d_deep,u_z_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
```

```
xlabel ('\itd (m)');
ylabel ('\itu_z (m/s)');
grid on

subplot (3,1,3)
plot(d_deep,u_res_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);

hold on
plot (d_deep,u_r_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_r (m/s)');
grid on

%% Tsunami Eigen Function (Acceleration) PLot for deep water
figure (4)
subplot (3,1,1)
plot(d_deep,a_x_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
            hold on
            plot (d_deep,a_x_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_x (m/s^2)');
grid on
title ('Eigen function distribution (acceleration) for deep water waves')

subplot (3,1,2)
plot(d_deep,a_z_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
                    hold on
            plot (d_deep,a_z_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
```

```
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_z(m/s^2)');
grid on

subplot (3,1,3)
plot(d_deep,a_res_deep,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','g',...
            'MarkerSize',5);
            hold on
            plot (d_deep,a_r_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_r (m/s^2)');

grid on

%% Tsunami Eigen Function (Velocity) PLot for Intermediate water
figure (5)

subplot (3,1,1)
plot(d_inter,u_x_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
                  hold on
            plot (d_inter,u_x_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_x (m/s)');
grid on
title ('Eigen function distribution (velocity) for intermediate water waves')

subplot (3,1,2)
plot(d_inter,u_z_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
                        hold on
            plot (d_inter,u_z_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
```

```
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_z (m/s)');
grid on

subplot (3,1,3)
plot(d_inter,u_res_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
            hold on
            plot (d_inter,u_r_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_r (m/s)');
grid on
hold on


%% Tsunami Eigen Function (acceleration) PLot for Intermediate water
figure (6)
subplot (3,1,1)
plot(d_inter,a_x_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
                    hold on
            plot (d_inter,a_x_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_x (m/s^2)');
title ('Eigen function distribution (acceleration) for intermediate water waves')
grid on

subplot (3,1,2)
plot(d_inter,a_z_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
                        hold on
            plot (d_inter,a_z_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
```

```
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_z (m/s^2)');
grid on

subplot (3,1,3)
plot(d_inter,a_res_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
                                hold on
            plot (d_inter,a_r_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_r (m/s^2)');
grid on

%% Tsunami Eigen Function (Velocity) PLot for Shallow water
figure (7)
subplot (3,1,1)
plot(d_shallow,u_x_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
          hold on
          plot(d_shallow,u_x_shallow_model_1,'--bs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
        h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_x (m/s)');
grid on;
title ('Eigen function distribution (velocity) for shallow water waves')

subplot (3,1,2)
plot(d_shallow,u_z_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
                hold on
          plot(d_shallow,u_z_shallow_model_1,'--bs','LineWidth',2,...
```

```
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
        h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_z(m/s)');
grid on;

subplot (3,1,3)
plot(d_shallow,u_res_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
          hold on
          plot(d_shallow,u_r_shallow_model_1,'--bs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
        h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\itu_r (m/s)');
grid on

%% Tsunami Eigen Function (acceleration) PLot for Shallow water
figure (8)
subplot (3,1,1)
plot(d_shallow,a_x_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
            hold on
            plot (d_shallow,a_x_shallow_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
              'MarkerFaceColor','g',...
              'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_x (m/s^2)');
grid on
title ('Eigen function distribution (acceleration) for shallow water waves')

subplot (3,1,2)
plot(d_shallow,a_z_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
          hold on
```

```
                    plot (d_shallow,a_z_shallow_model_1,'--
bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_z (m/s^2)');
grid on

subplot (3,1,3)
plot(d_shallow,a_res_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
                hold on
                    plot (d_shallow,a_r_shallow_model_1,'--
bs','LineWidth',2,'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\ita_r (m/s^2)');
grid  on

%% Tsunami Eigen Function (wave potential) PLot
figure (9)
subplot (3,1,1)
plot(d_deep,phi_deep,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','g',...
            'MarkerSize',5);
             hold on
             plot (d_deep,phi_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\phi');
grid on
title ('Tsunami eignen function (wave potential) for deep, intermediate and shallow waters')

subplot (3,1,2)
plot(d_inter,phi_inter,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
```

```
                hold on
            plot (d_inter,phi_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
              'MarkerFaceColor','g',...
              'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd (m)');
ylabel ('\phi');
grid on;

subplot (3,1,3)
plot(d_shallow,phi_shallow,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
                hold on
            plot (d_shallow,phi_shallow_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
              'MarkerFaceColor','g',...
              'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itd(m)');
ylabel ('\phi');
grid  on


%% Resultant velocity curve for deep,intermediate and shallow waters
figure (10);
subplot (3,1,1)
plot(t,u_res_deep,'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','g',...
            'MarkerSize',5);
xlabel ('\itt (s)');
ylabel ('\itu_r (m/s)');
grid on
title ('Resultant velocity curve for deep,intermediate and shallow waters')

subplot (3,1,2)
plot(t,u_res_inter,'-gs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
xlabel ('\itt (s)');
ylabel ('\itu_r (m/s)');
grid on

subplot (3,1,3)
```

```
plot(t,u_res_shallow,'-bs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','k',...
                'MarkerSize',5);
xlabel ('\itt(s)');
ylabel ('\itu_r (m/s)');

grid on
%% Resultant accelaration curve for deep,intermediate and shallow waters

figure (11)
subplot (3,1,1)
plot(t,a_res_deep,'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
                'MarkerSize',5);
xlabel ('\itt (s)');
ylabel ('\ita_r (m/s^2)');
grid on
title ('Resultant acceleration curve for deep,intermediate and shallow waters')

subplot (3,1,2)
plot(t,a_res_inter,'-gs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','b',...
                'MarkerSize',5);
xlabel ('\itt (s)');
ylabel ('\ita_r (m/s^2)');

grid on
subplot (3,1,3)
plot(t,a_res_shallow,'-bs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','k',...
                'MarkerSize',5);
xlabel ('\itt(s)');
ylabel ('\ita_r (m/s^2)');
grid on

%% Tsunami Celerity for deep,intermediate and shallow waters

figure (12)
subplot (3,1,1)
plot(x_deep./1000, (c_deep),'-rs','LineWidth',2,...
                'MarkerEdgeColor','k',...
                'MarkerFaceColor','g',...
```

```
            'MarkerSize',5);
                    hold on
             plot (x_deep./1000,c_deep_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itx (km)');
ylabel ('\itc (m/s)');

grid on
title ('Celerity for deep, intermediate and shallow waters')
subplot (3,1,2)
plot(x_inter./1000, (c_inter),'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','b',...
            'MarkerSize',5);
                        hold on
             plot (x_inter./1000,c_inter_model_1,'--bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itx (km)');
ylabel ('\itc (m/s)');

grid on
subplot (3,1,3)
plot(x_shallow./1000, (c_shallow),'-rs','LineWidth',2,...
            'MarkerEdgeColor','k',...
            'MarkerFaceColor','k',...
            'MarkerSize',5);
                                hold on
             plot (x_shallow./1000,c_shallow_model_1,'--
bs','LineWidth',2,'MarkerEdgeColor','k',...
               'MarkerFaceColor','g',...
               'MarkerSize',5);
h = legend('Model','Standard model',1);
xlabel ('\itx(km)');
ylabel ('\itc (m/s)');
grid on
end
```