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LAMPIRAN

Lampiran 1. Program MATlAB Perambatan Gelombang TSunami Skema DuFort-Frankel

```
clc;
clear all;
close all;
%% parameter
%Panjang selang
Lx=input('Masukkan panjang selang (panjang x=y) = ');
Ly=Lx;
%Lx=24;
%Ly=24;
%lebar selang
dx=input('Masukkan dx(dx=dy) = ');
%dx=0.2;
dy=dx;
dt=input('Masukkan ukuran time step (dt) = ');
%dt=dx/sqrt(2*g*b)%ukuran time step
%dt=0.001;
b=input('Masukkan kedalaman dasar saluran (b) = ');
%b=10;%kedalaman dasar saluran
g=input('Masukkan nilai gravitasi (g) = ');
%g=10;%percepatan gravitasi
i0=input('Masukkan posisi xo = ');
%i0=60;
j0=input('Masukkan posisi y0 = ');
%j0=60;
t=input('Masukkan panjang waktu(t)= ');
%t=5;%waktu
A=input('Masukkan nilai amplitudo(A)= ');
%A=1;%amplitudo gelombang
R=input('Masukkan nilai jari-jari(R)= ');
%R=5;%lebar lonceng fungsi gaussian bell
%banyak titik hitung
nx=(ceil(Lx/dx))+1;
ny=(ceil(Ly/dy))+1;
nt=t/dt;
[x, y]=meshgrid(linspace(0,Lx,nx),linspace(0,Ly,ny));
%% Membuat matriks
H=zeros(nx,ny,nt);  U=zeros(nx,ny,nt);  V=zeros(nx,ny,nt);
%% Menentukan Syarat awal. h pada t=0
%posisi syarat awal atau posisi awal gelombang melingkar (x0,y0)
for n=1;
for i=1:nx
   for j=1:ny
       a(i,j,1)=((i-i0)^2)+((j-j0)^2);
       r=2*R;
       if a(i,j,1)<= R^2
      H(i,j,1)=A*cos((pi/r)*sqrt(((i-i0)^2)+((j-j0)^2)));
       else
     H(i,j,1)=0;
       end
   end
```

```
end
end
%% syarat batas
%bawah
for n=1:nt;
    for j=1;
        for i=1:nx;
            H(i,j,n)=0;
            U(i,j,n)=0;
            V(i,j,n)=0;
        end
    end
end
%atas
for n=1:nt;
    for j=ny;
        for i=1:nx;
            H(i,j,n)=0;
            U(i,j,n)=0;
            V(i,j,n)=0;
        end
    end
end
%kiri
for n=1:nt;
    for j=1:ny;
        for i=1;
            H(i,j,n)=0;
            U(i,j,n)=0;
            V(i,j,n)=0;
        end
    end
end
%kanan
for n=1:nt;
    for j=1:ny;
        for i=nx;
            H(i,j,n)=0;
            U(i,j,n)=0;
            V(i,j,n)=0;
        end
    end
end
for n=1
%%gambar syarat awal dan syarat batas
surf(x,y,transpose (H(:,:,n)));
shading interp
colorbar;
axis ([0 Lx 0 Ly -A A])
title(['Syarat Awal']);
zlabel('Elevasi gelombang')
xlabel('panjang x (m)')
ylabel('Panjang y (m)')
end
%% metode beda hingga Duffort-Frankle
for n=1:nt
    t1=n*dt;
```

```
% batas reflektif
H(:,2,:) = H(:,3,:);         U(:,2,:) = U(:,3,:);          V(:,2,:)
= -V(:,3,:);
H(:,ny-1,:) = H(:,ny-2,:);   U(:,ny-1,:) = U(:,ny-2,:);    V(:,ny-
1,:) = -V(:,ny-2,:);
H(2,:,:) = H(3,:,:);         U(2,:,:) = -U(3,:,:);         V(2,:,:)
= V(3,:,:);
H(nx-1,:,:) = H(nx-2,:,:);   U(nx-1,:,:) = -U(nx-2,:,:);   V(nx-
1,:,:) = V(nx-2,:,:);
    if n==1 %FTCS
    for i=2:nx-1
        for j=2:ny-1
            U(i,j,n+1)=U(i,j,n)-g*(dt/2*dx)*(H(i+1,j,n)-H(i-
1,j,n));
            V(i,j,n+1)=V(i,j,n)-g*(dt/2*dy)*(H(i,j+1,n)-H(i,j-
1,n));
            H(i,j,n+1)=H(i,j,n)-(b*dt/2*dx)*(U(i+1,j,n)-U(i-
1,j,n))-((b*dt/2*dy)*(V(i,j+1,n)-V(i,j-1,n)));
        end
    end
    else %DuFort-Frankel
       for i=2:nx-1
        for j=2:ny-1
            U(i,j,n+1)=U(i,j,n-1)-g*(dt/dx)*(H(i+1,j,n)-H(i-
1,j,n));
            V(i,j,n+1)=V(i,j,n-1)-g*(dt/dy)*(H(i,j+1,n)-H(i,j-
1,n));
            H(i,j,n+1)=H(i,j,n-1)-b*(dt/dx)*(U(i+1,j,n)-U(i-
1,j,n))-b*(dt/dy)*(V(i,j+1,n)-V(i,j-1,n));
        end
      end
 end
%% gambar hasil
figure(1)
surf(x,y,transpose (H(:,:,n)));
shading interp
colorbar;
axis ([0 Lx 0 Ly -A A])
title(['Waktu ke - ',num2str(t1),' detik ']);
zlabel('Elevasi gelombang')
xlabel('Panjang x (m)')
ylabel('Panjang y (m)')
end
```