

LAMPIRAN

Lampiran1. *M-script* untuk visualisasi persamaan (3.63)

>restart :

with(plots) :

$$An := \frac{1 - (-1)^n}{\pi} \left(1 + \frac{1}{2} \left(\frac{1}{h-n} - \frac{1}{h+n} \right) \right);$$

$$\frac{(1 - (-1)^n) \left(1 + \frac{1}{2(h-n)} - \frac{1}{2(h+n)} \right)}{\pi}$$

$Bn := 0$

0

$$u := \text{sum} \left(\left(An \cdot \cos \left(\frac{n \cdot \pi \cdot c \cdot t}{l} \right) + Bn \cdot \sin \left(\frac{n \cdot \pi \cdot c \cdot t}{l} \right) \right) \cdot \sin \left(\frac{n \cdot \pi \cdot x}{l} \right), n = 0 .. 2 \right),$$

$$\sum_{n=0}^2 \left(An \cos \left(\frac{n \pi c t}{l} \right) + Bn \sin \left(\frac{n \pi c t}{l} \right) \right) \sin \left(\frac{n \pi x}{l} \right)$$

p1 := (u) :

p2 := subs(c = 1, l = 1, h = 2, p1) :

plot3d(p2, x = 0 .. 1, t = 0.1 .. 0.2)

Lampiran2. *M-script* untuk visualisasi persamaan (3.63)

>restart

>with(plots) :

$$>An := \frac{1 - (-1)^n}{\pi} \left(1 + \frac{1}{2} \left(\frac{1}{h-n} - \frac{1}{h+n} \right) \right);$$

$$An := \frac{(1 - (-1)^n) \left(1 + \frac{1}{2(h-n)} - \frac{1}{2(h+n)} \right)}{\pi}$$

>Bn := 0

$Bn := 0$

$$>u := \text{sum} \left(\left(An \cdot \cos \left(\frac{n \cdot \pi \cdot c \cdot t}{l} \right) + Bn \cdot \sin \left(\frac{n \cdot \pi \cdot c \cdot t}{l} \right) \right) \cdot \sin \left(\frac{n \cdot \pi \cdot x}{l} \right), n = 0 .. 2 \right),$$

$$u := \sum_{n=0}^2 \left(An \cos \left(\frac{n \pi c t}{l} \right) + Bn \sin \left(\frac{n \pi c t}{l} \right) \right) \sin \left(\frac{n \pi x}{l} \right)$$

>p1 := (u) :

>p2 := subs(c = 1, l = 1, h = 2, p1) :

>a1 := subs(t = 0.1, p2) :

>a2 := subs(t = 0.2, p2) :

>plot({a1, a2}, x = 0 .. 1, thickness = 1);

Lampiran2. *M-script* untuk visualisasi persamaan (3.66)

>> Nx = 101; % x-Grids

dx = 1; % Step size

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x(:,1) = (0:Nx-1)*dx;

mpx = (Nx+1)/2; % Mid point of x axis
        % ( Mid pt of 1 to 101 = 51 here )

T = 1001;    % Total number of time steps
f = 10;      % frequency of source
dt = 0.001;  % Time-Step
t(:,1) = (0:T-1)*dt;

v = 500;     % Wave velocity
c = v*(dt/dx); % CFL condition
U = zeros(T,Nx); % U(x,t) = U(space,time)

s1 = floor(T/f);
%-----%

% Initial condition

U((1:s1),1) = 0.5-0.5*cos(2*pi*f.*t(1:s1));
U((1:s1),2) = 0.5-0.5*cos(2*pi*f.*t(1:s1));
%-----%

% Finite Difference Scheme

for j = 3:T
    for i = 2:Nx-1
        U1 = 2*U(j-1,i)-U(j-2,i);

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    U2 = U(j-1,i-1)-2*U(j-1,i)+U(j-1,i+1);
    U(j,i) = U1 + c*c.*U2;
end
end
%-----%

% Plot the results
plot_times = [100 200 300 400];

for i = 1:4

    figure(i)
    k = plot_times(i);
    plot(x,U(k,:), 'linewidth',2);
    grid on;
    axis([min(x) max(x) -2 2]);
    xlabel('X axis','fontSize',10);
    ylabel('Wave Amplitude','fontSize',10);
    titlestring = ['TIME STEP = ',num2str(k), ' TIME = ',num2str(t(k)), 'second'];
    title(titlestring , 'fontsize',10);

    h=gca;
    get(h,'FontSize')
    set(h,'FontSize',10);

    fh = figure(i);
    set(fh, 'color', 'white');

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