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Eular method for Nx=10

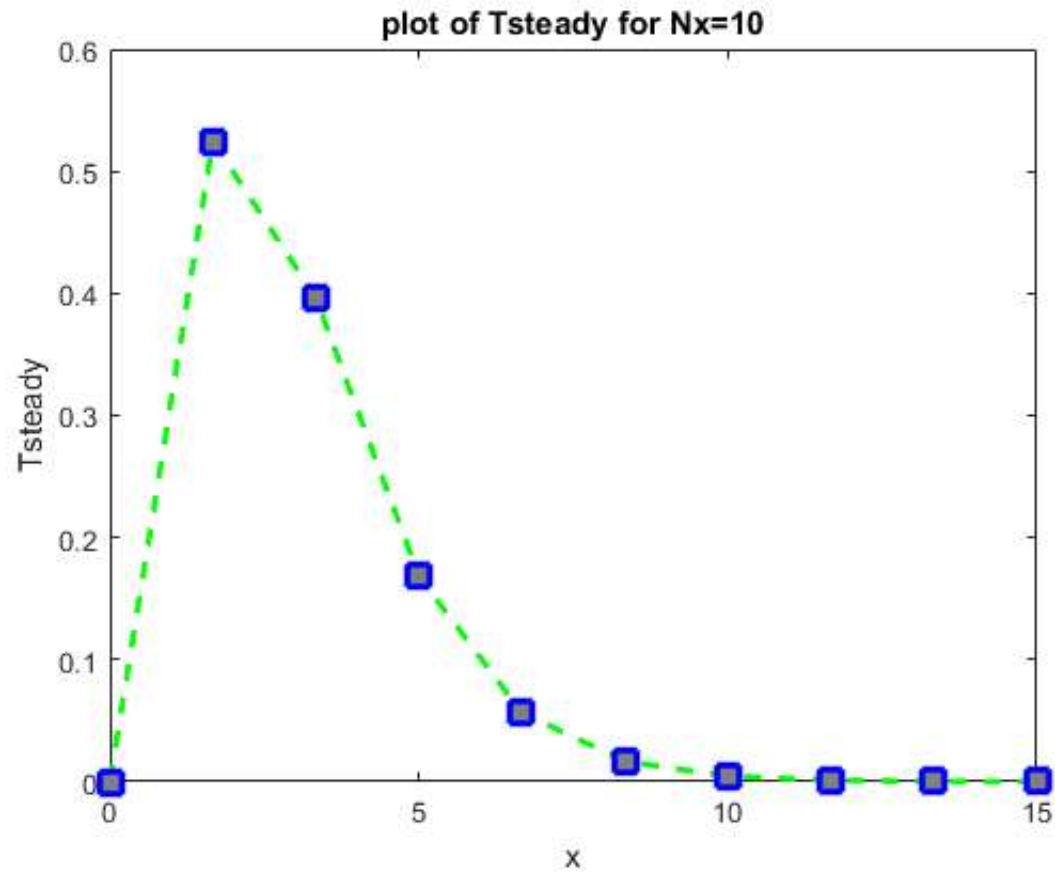
```
clc;clear all
% Initial conditions
x0=0;
Lx=15;
Nx=10;
x=linspace(x0,Lx,Nx);
dx=x(2)-x(1);
t0=0;
t_final=150;
Nt=200;
t=linspace(t0,t_final,Nt);
dt=t(2)-t(1);
alpha=1;

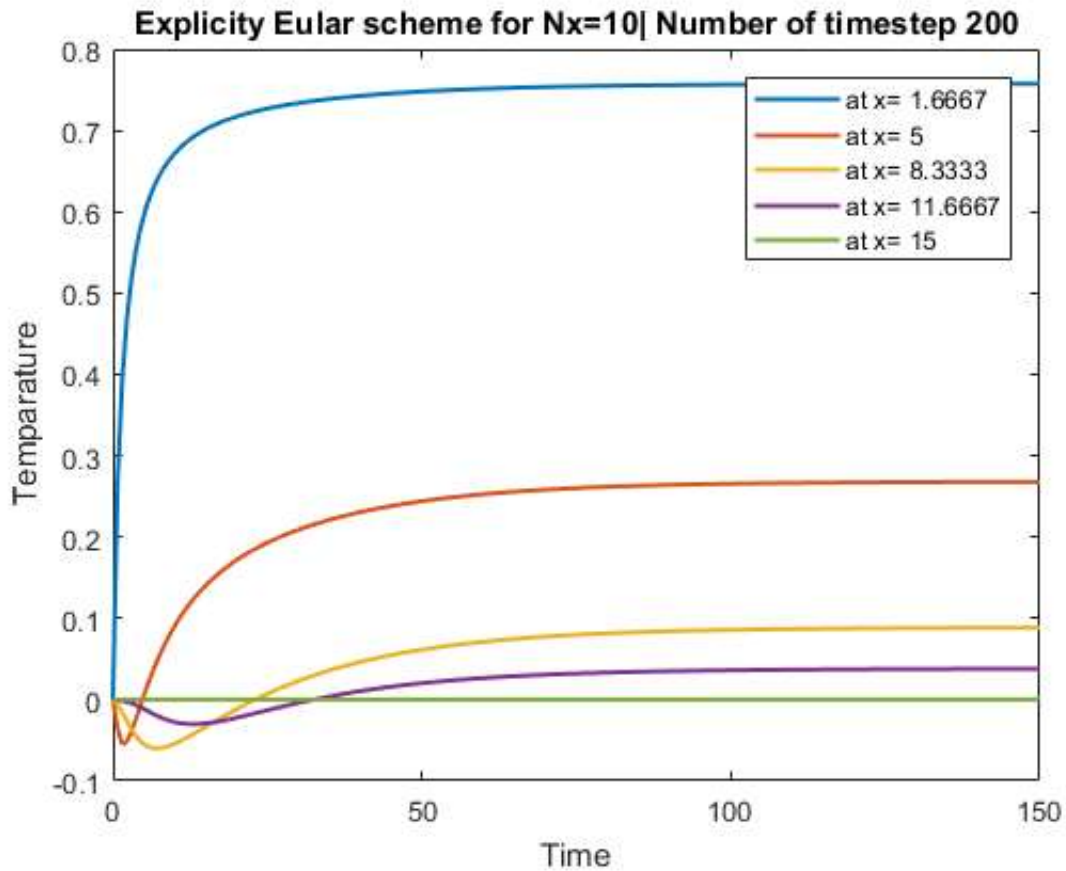
%Boundary condition
T=zeros(Nx,Nt);
T_steady=x.^2.*exp(-x);
S_x=-(x.^2-4.*x+2).*exp(-x);
T(:,1)=0;
T(1,:)=0;
T(:,end)=T_steady*Lx;

figure(1)
plot(x,T_steady,'--gs',...
      'LineWidth',2,...
      'MarkerSize',10,...
      'MarkerEdgeColor','b',...
      'MarkerFaceColor',[0.5,0.5,0.5])
title('plot of Tsteady for Nx=10')
xlabel('x');
ylabel('Tsteady');

for i =1:length(t)-1
    for j=2:length(x)-1
        Txx=(T(j-1,i)-2*T(j,i)+T(j+1,i))/dx^2;
        T(j,i+1)=T(j,i)+dt*(alpha*Txx+S_x(j));
    end
end
figure(2)
for m=2:2:length(x)
    txt=[ 'at x= ',num2str(x(m)) ];
    plot(t,T(m,:), 'LineWidth',1.5, 'DisplayName',txt);
    hold on
end
xlabel('Time');
ylabel('Temparature')
legend show
```

```
title('Explicit Euler scheme for Nx=10| Number of timestep 200')
```





Eular Method for Nx=20

```

clc;clear all
% Initial conditions
x0=0;
Lx=15;
Nx=20;
x=linspace(x0,Lx,Nx);
dx=x(2)-x(1);
t0=0;
t_final=150;
Nt=600;
t=linspace(t0,t_final,Nt);
dt=t(2)-t(1);
alpha=1;

%Boundary condition
T=zeros(Nx,Nt);
T_steady=x.^2.*exp(-x);
S_x=-(x.^2-4.*x+2).*exp(-x);
T(:,1)=0;
T(1,:)=0;
T(:,end)=T_steady*Lx;

figure(3)
plot(x,T_steady,'--gs',...
      'LineWidth',2,...
      'MarkerSize',10,...

```

```

    'MarkerEdgeColor','b',...
    'MarkerFaceColor',[0.5,0.5,0.5])
title('plot of Tsteady for Nx=20')
xlabel('x');
ylabel('Tsteady');

for i =1:length(t)-1
    for j=2:length(x)-1
        Txx=(T(j-1,i)-2*T(j,i)+T(j+1,i))/dx^2;
        T(j,i+1)=T(j,i)+dt*(alpha*Txx+S_x(j));
    end
end
figure(4)
for m=2:2:length(x)
    txt=['at x= ',num2str(x(m))];
    plot(t,T(m,:), 'LineWidth',1.5, 'DisplayName',txt);
    hold on
end
xlabel('Time');
ylabel('Temperature')
legend show
title('Explicit Euler scheme for Nx=20|Timestep=600')

```

