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% CODE FOR ANALYTICAL SOLUTION %
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N=50; % No. of Calculation Points %
L=0.5; % Length %
nodes=[0:(L/(N-1)):L]; % Node Positions %
strain=zeros(N-1,1); % Defn of Strain and Displacement Matrices %
u=zeros(N,1);
E=70e9; % Elasticity Modulus %
z=0;
A=(pi/4)*0.01*0.01; % Area %
for i=1:N
    x=nodes(i);
    u(i,1)=((20*sin(10*pi*x))/(E*A*(pi^2))+((200/(pi*A*E))-(1e6/E))*x); %Displacement
    strain(i,1)=(((200*cos(10*pi*x))/(E*A*pi))+((200/(pi*A*E))-(1e6/E))); %Strain
end
xlabel('X distance');
ylabel('Displacement U');
title('Displacement Field Analytical');
legend('Displacement Field');
plot(nodes,u); % Graph of Displacement Field %
figure;
plot(nodes,strain); % Graph of Strain Field %
xlabel('X distance');
ylabel('Strain');
title('Strain Field Analytical');
legend('Strain Field Analytical');

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