```
    end
b3 = 5e-2*ones(Nnodes,1);

% -rout + rin < 0 ---> rout > rin
A4 = zeros(Nnodes,2*Nnodes);
k=1;
for i=1:Nnodes
    A4(i,k) = -1;
    A4(i,k+1) = 1;
    k = k+2;
end
b4 = zeros(Nnodes,1);
A = [A1;A2;A3;A4];
b = [b1;b2;b3;b4];

lb = ones(2*Nnodes,1);
ub = lb;
lb(2:2:end) = 0.01;
lb(1:2:end) = 0.0175;
ub(2:2:end) = 0.0475;
ub(1:2:end) = 0.05;
```

Running Optimization

```
options = optimoptions('fmincon','Display','iter-detailed','Algorithm','sqp',...
    'SpecifyObjectiveGradient',true,'SpecifyConstraintGradient',true);

[X_opt,fvalue,~,op,~,grad]=fmincon(@obj_func,X0,A,b,[],[],lb,ub,@NonLnCons,options);
```

Plotting section

```
Iyy = Calc_Iyy(X_opt,Nnodes);
force = Calc_force(x,500,L);
[u] = CalcBeamDisplacement(L, 70e9,Iyy, force, Nelem);
zmax = X_opt(1:2:end);
[sigma] = CalcBeamStress(L, 70e9, zmax, u, Nnodes-1);
norm_sigma = sigma/600e6;
figure
plot(x,norm_sigma,'ks-')
xlabel('distance along wing')
ylabel('magnitude of normal stress')

figure
plot(x,sigma,'ks-')
xlabel('distance along wing')
ylabel('magnitude of normal stress')

figure
plot(x,u(1:2:2*(Nelem+1)),'ks-');
xlabel('distance along wing')
ylabel('vertical displacement of spar')

figure
plot(x,X_opt(1:2:end),'bv-');
hold on;
plot(x,X_opt(2:2:end),'k^-');
plot(x,-X_opt(1:2:end),'bv-');
plot(x,-X_opt(2:2:end),'k^-');
```