Project 4 Master Code

Table of Contents

By 6110

Inital Variables and Constraints

computational values Change these for altering the analysis model

```
close all; clear all;
nodes =15; % number of nodes evaluated at
NCP=3;
NPP=4;
% model variables
mass =500; % kg
L = 7.5; % meter
E = 70*10^9; % Pa
Y=600 *10^6; % Yeild Stress Pa
rho = 1600.0;   % density (kg /m^3)
    w = (2.5 * 9.8 *.5* 500); % plane weight
```

Create bounds

Creates linear bounds

```
rdist=2.5*10^-3; % thickness, m
rmin=1*10^-2; % min radi m
rmax = 5*10^-2; % max radi m


A=zeros(nodes,nodes*2); % prealloc
for i=1:nodes
    A(i, i)=1; % lower node
    A(i, i+nodes)=1; % upper node
    b(i)=rmax; % distance

    lb(1,i)=rmin; %% lb for r_low
    ub(1,i)=rmax-rdist; %% ub for r_low
    lb(1,i+nodes)=rdist; % lb for thick
    ub(1,i+nodes)=rmax-rmin-rdist; %up for think
end
```

Initalize wing object

provide the nominal spar values as initial parameter

```matlab
r_in = 0.0415*ones(nodes,1); % nominal values of inner radii
thicc = 0.0085*ones(nodes,1); % nominal values of annular thickness
x0 = [r_in;thicc];              % concactenated design vector

wing=Spar(w,L,rho,E,Y,nodes,x0,A,b,lb,ub,NCP,NPP);
```

Start fmincon

```matlab
tic % start timer
[sprMss,sprGeo,exp,var,std,wts,pts,exitFlag, fmincOutput ]
 =fmincon_handle(wing);
fprintf('Nx=%d,Spar is %.5f kg, ',nodes,sprMss); % print mass
toc % output run time
makePlots(sprGeo,pts,wts,wing,exp,var,std); % create plots
```

Published with MATLAB® R2018b