Contents

Single Point Approx Student: Daniel Clark

```
clear all                                          % Instructor: Dr. Ha-Rok Bae
close all                                          % Class: ME 7060 Spring 2016
clc
format shorte
```

Given information

```
E = 29*10^6;        % lb/in^2
L = 30*12;          % was ft now in
w = 1*10^3/12;      % was kip/ft now lbs/in

delta_max = @(P,I) (P.*L.^3)./ (48.*E.*I) + (5*w.*L.^4)./(385.*E.*I);
dmax_dP =
dmax_dI =
```

Normal

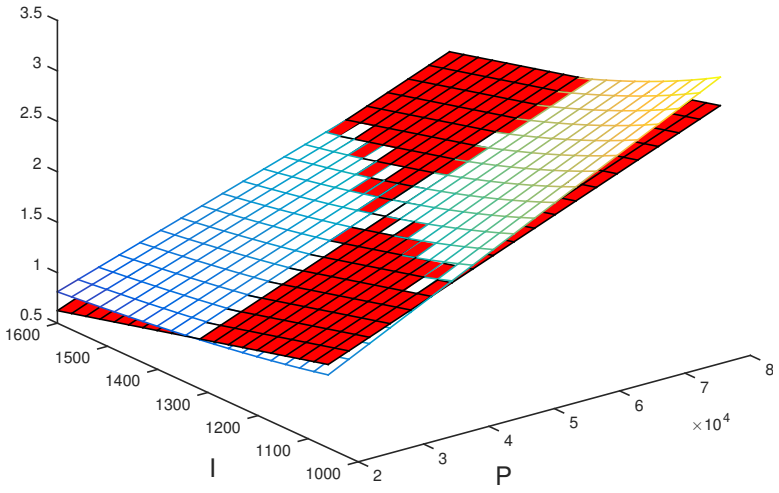
```
mu_I = 1.33*10^3;      % in^4
sigma_I = 9*10^1;      % in^4
mu_P = 50*10^3;        % was kip now lbs
sigma_P = 10*10^3;     % was kip now lbs

x2 = [mu_P, mu_I];
g1 = delta_max(mu_P, mu_I);

dg_dxi = [dmax_dP(mu_P, mu_I),dmax_dI(mu_P, mu_I)];
```

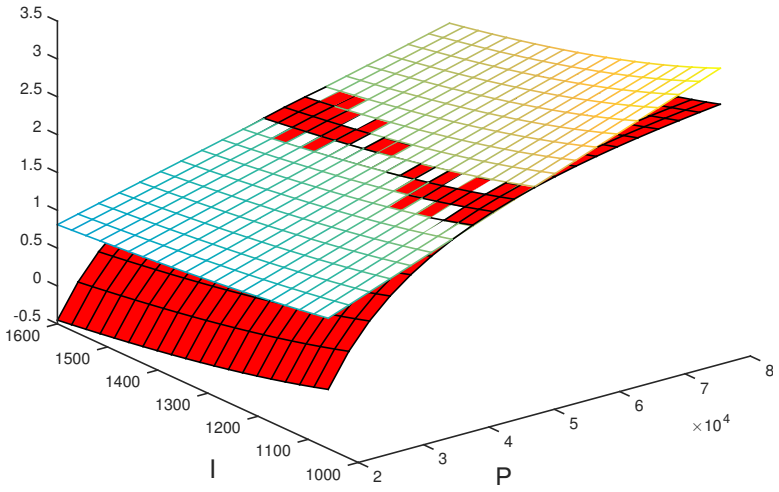
Compare the approximation Methods

```
gridNum = 20;
S = [mu_P-3*sigma_P , mu_I-3*sigma_I; mu_P+3*sigma_P , mu_I+3*sigma_I];
testpoints = gridsamp([min(S(:,1)) min(S(:,2)); max(S(:,1)) max(S(:,2))], gridNum);


number = gridNum*gridNum;
matrix = zeros(number,3);
direction = [1,1,1];
```

```
StepSize = linspace(-5,5,number);

for i = 1:number
    xApprox = testpoints(i,:);
    act = delta_max(testpoints(i,1),testpoints(i,2));
    L = Approx_linear(g1, xApprox, x2, dg_dxi);
    R = Approx_reciprocal(g1, xApprox, x2, dg_dxi);

    matrix(i,1) = L;
    matrix(i,2) = R;
    matrix(i,3) = act;

end
```

Plots




3.5
3
2.5
2
1.5
1
0.5
0
-0.5
1600
1500
1400
1300
1200
1100
1000
I
2
3
4
5
6
7
8
×10^4
P