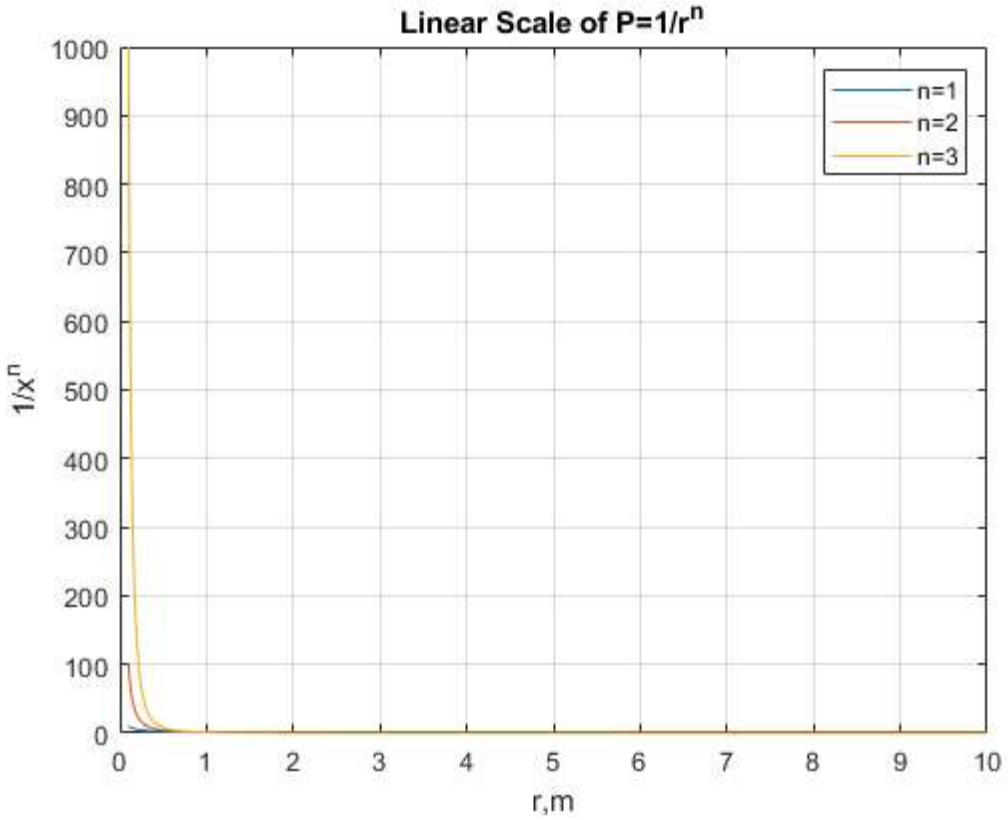
## Contents



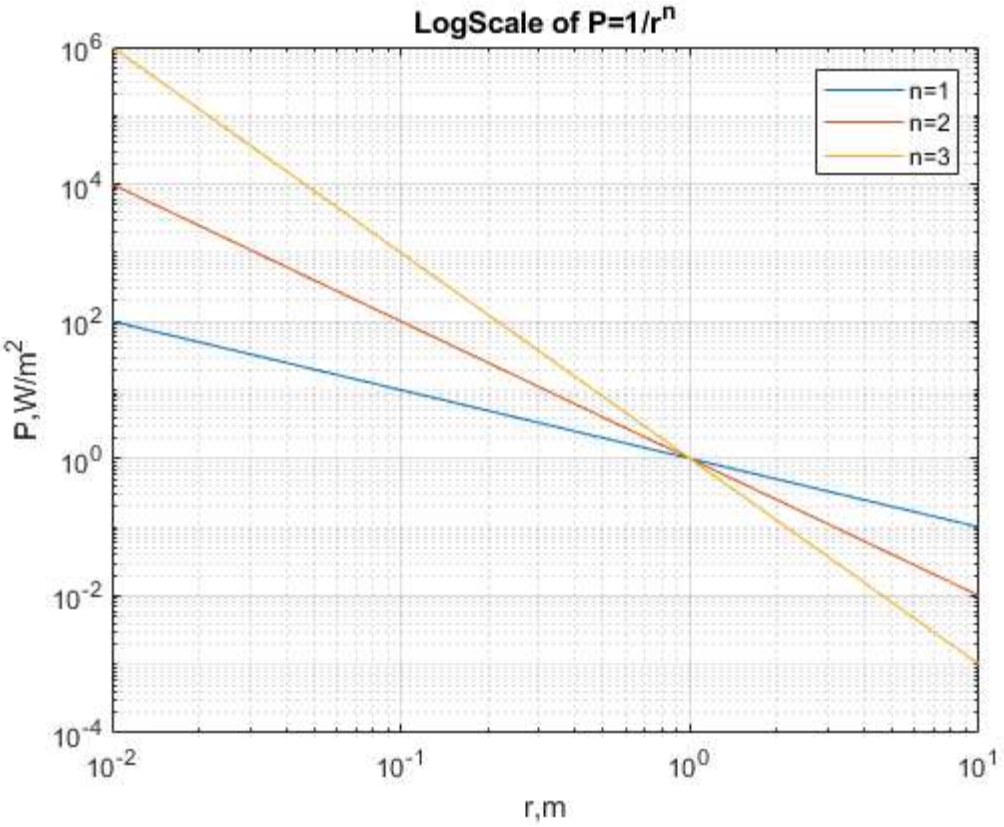
## LINEAR SCALE

```
close all;
clear;
clc;
%------------------------------------------------------------------------
figure
n = [1,2,3];
for z = 1:length(n) % Grid of 1 spacing from 1 to 3
    x = 0.1 : 0.01 : 10; % Grid of 0.01 spacing from 0 to 10
    y = 1./((x).^n(z)); % Evaluate function on xvals
    plot(x, y); % Create line plot with yvals against xvals
    hold on;
end
title('Linear Scale of P=1/r^n')
xlabel('r,m')
ylabel('1/x^n')
grid on
hold off;
legend('n=1','n=2','n=3')
```



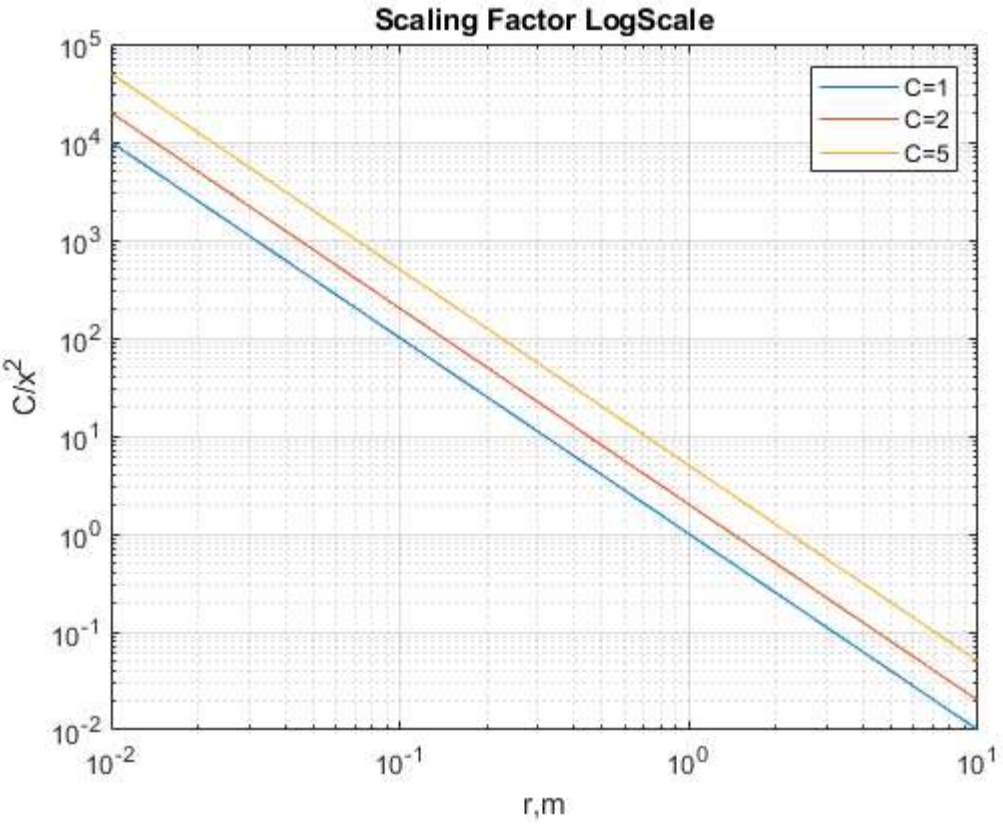

## LOGLOG SCALE

```
figure
for n= 1:1:3 % Grid of 1 spacing from 1 to 3
    xvals = 0:0.01:10; % Grid of 0.01 spacing from 0 to 10
    yvals = 1./((xvals).^n); % Evaluate function on xvals
    loglog(xvals, yvals); % Create line plot with yvals against xvals
    hold on;
end
title('LogScale of P=1/r^n')
xlabel('r,m')
ylabel('P,W/m^2')
grid on
hold off;
legend('n=1','n=2','n=3')
```




## SCALING FACTOR LOGLOG SCALE

```
figure
for c= [1,2,5] % Grid of 1 spacing from 1 to 3
    xvals = 0:0.01:10; % Grid of 0.01 spacing from 0 to 10
    yvals = c./((xvals).^2); % Evaluate function on xvals
    loglog(xvals, yvals); % Create line plot with yvals against xvals
    hold on;
end
title('Scaling Factor LogScale');
xlabel('r,m')
ylabel('C/x^2')
grid on
hold off;
legend('C=1','C=2','C=5')
```



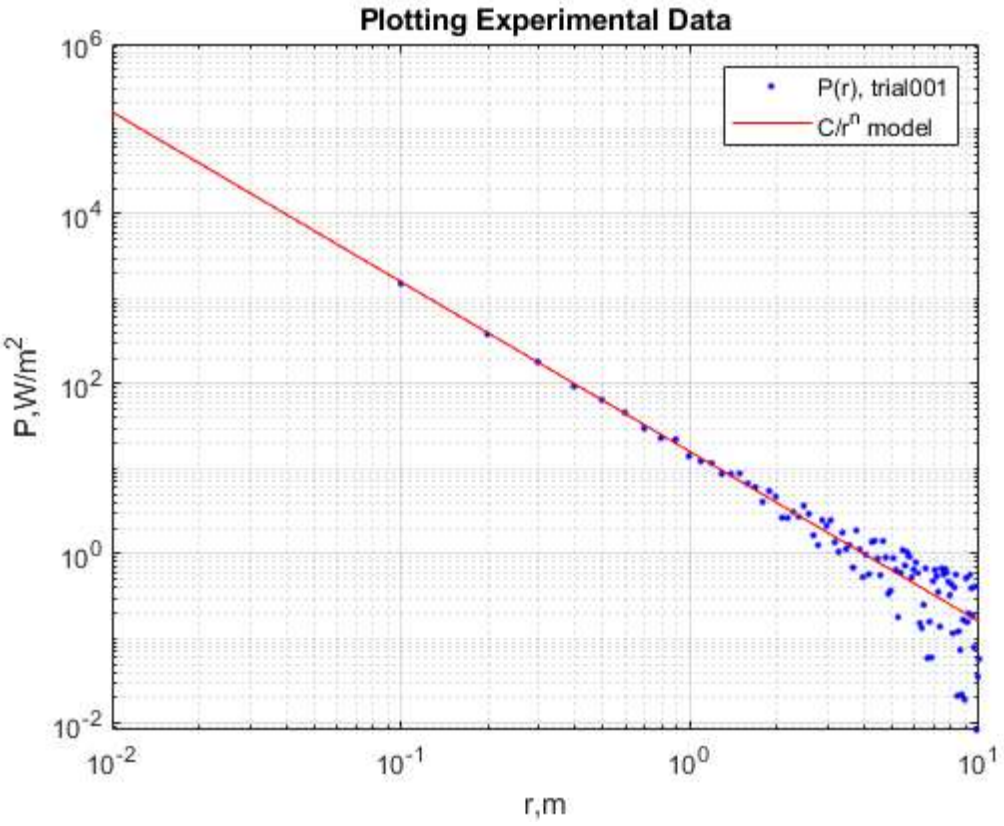

## PLOTTING EXPERIMENTAL DATA

```
type p-vs-r-001.txt
M = readmatrix('p-vs-r-001.txt');
figure
loglog( M(:,1),M(:,2), '.b' );
%plotting the curve overlay
%C=P*r^2 = 15.86
hold on;
xvals = 0:0.01:10; % Grid of 0.01 spacing from 0 to 10
yvals = 15.86087./((xvals).^2); % Evaluate function on xvals
loglog(xvals, yvals,'r'); % Create line plot with yvals against xvals
xlabel('r,m')
ylabel('P,W/m^2')
title('Plotting Experimental Data')
grid on
hold off;
legend('P(r), trial001','C/r^n model')
```

```
   r,m  P, W/m^2
---------------------------
0.100000        1511.856711
0.199000        384.279698
0.298000        179.814457
0.397000        92.774489
0.496000        64.470905
0.595000        45.643256
0.694000        29.970237
0.793000        22.917235
0.892000        22.148909
0.991000        14.024184
```

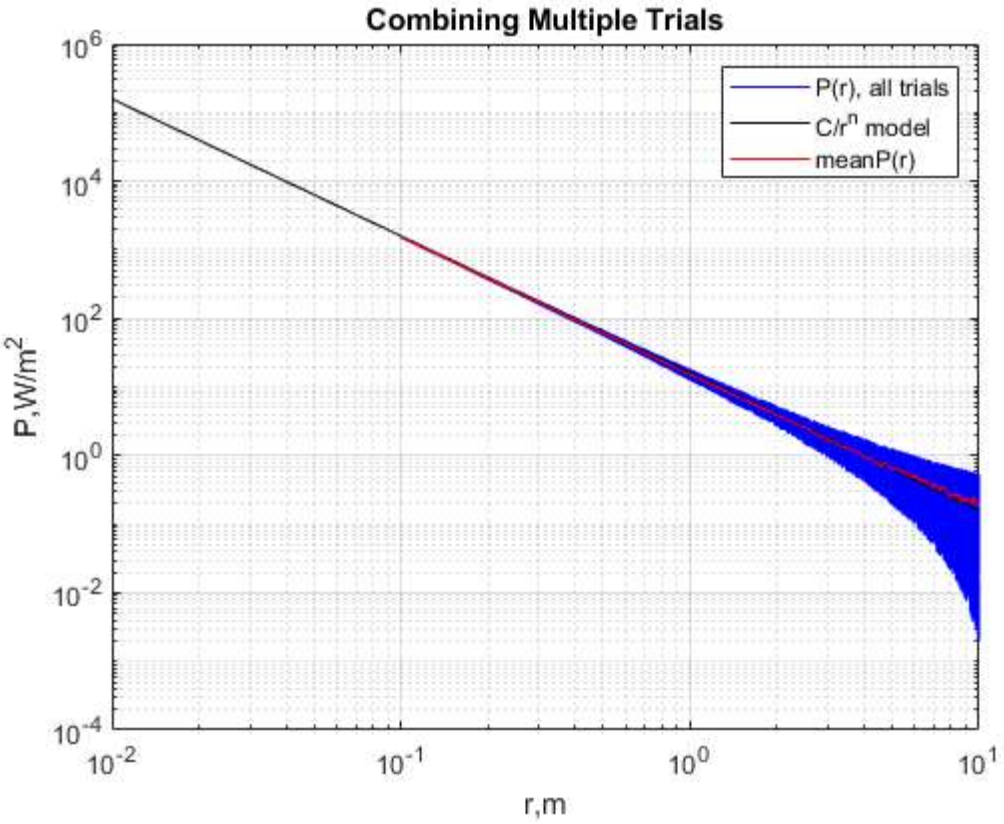
| | |
|---|---|
| 1.090000 | 12.274986 |
| 1.189000 | 11.600084 |
| 1.288000 | 8.688495 |
| 1.387000 | 8.686138 |
| 1.486000 | 8.784994 |
| 1.585000 | 6.682864 |
| 1.684000 | 6.051874 |
| 1.783000 | 4.065002 |
| 1.882000 | 5.467859 |
| 1.981000 | 4.697397 |
| 2.080000 | 2.649941 |
| 2.179000 | 2.628771 |
| 2.278000 | 3.084849 |
| 2.377000 | 2.728517 |
| 2.476000 | 3.657156 |
| 2.575000 | 2.939120 |
| 2.674000 | 1.644274 |
| 2.773000 | 1.259111 |
| 2.872000 | 2.476950 |
| 2.971000 | 2.126614 |
| 3.070000 | 2.469840 |
| 3.169000 | 1.358545 |
| 3.268000 | 1.050773 |
| 3.367000 | 1.766830 |
| 3.466000 | 1.127909 |
| 3.565000 | 1.263900 |
| 3.664000 | 0.686027 |
| 3.763000 | 1.870860 |
| 3.862000 | 1.120045 |
| 3.961000 | 0.530306 |
| 4.060000 | 0.969743 |
| 4.159000 | 0.572033 |
| 4.258000 | 1.369573 |
| 4.357000 | 1.419265 |
| 4.456000 | 0.877961 |
| 4.555000 | 0.558141 |
| 4.654000 | 1.406746 |
| 4.753000 | 0.901398 |
| 4.852000 | 0.337624 |
| 4.951000 | 0.365820 |
| 5.050000 | 0.883102 |
| 5.149000 | 0.637107 |
| 5.248000 | 0.178746 |
| 5.347000 | 0.594841 |
| 5.446000 | 1.103794 |
| 5.545000 | 0.724752 |
| 5.644000 | 1.038881 |
| 5.743000 | 0.922686 |
| 5.842000 | 0.526221 |
| 5.941000 | 0.652020 |
| 6.040000 | 0.788423 |
| 6.139000 | 0.590919 |
| 6.238000 | 0.152515 |
| 6.337000 | 0.133436 |
| 6.436000 | 0.249424 |
| 6.535000 | 0.667869 |
| 6.634000 | 0.058981 |
| 6.733000 | 0.157717 |
| 6.832000 | 0.059836 |
| 6.931000 | 0.473333 |
| 7.030000 | 0.643710 |

```
7.129000        0.543248
7.228000        0.353388
7.327000        0.138236
7.426000        0.668816
7.525000        0.570409
7.624000        0.662728
7.723000        0.603355
7.822000        0.469310
7.921000        0.323940
8.020000        0.436790
8.119000        0.115821
8.218000        0.397742
8.317000        0.564217
8.416000        0.021153
8.515000        0.121753
8.614000        0.073329
8.713000        0.021975
8.812000        0.166148
8.911000        0.019108
9.010000        0.513786
9.109000        0.156024
9.208000        0.197244
9.307000        0.562634
9.406000        0.390332
9.505000        0.183600
9.604000        0.078854
9.703000        0.409229
9.802000        0.008398
9.901000        0.035569
10.000000       0.057569
```




## Combining Multiple Trials

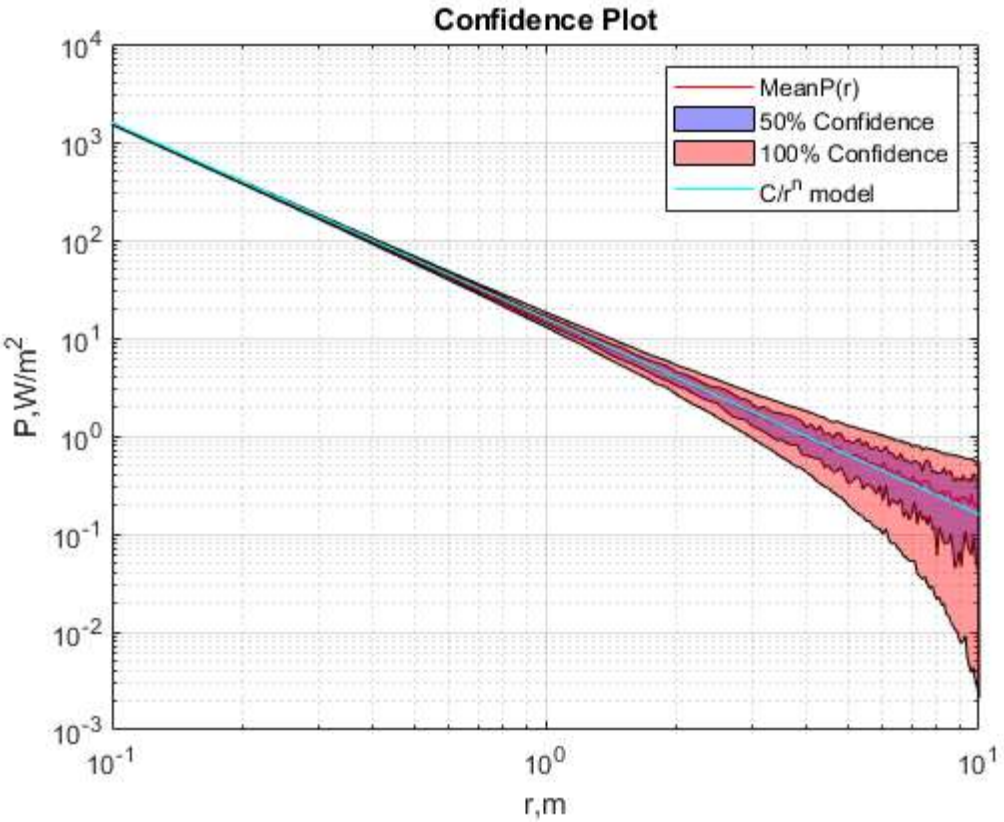
```
files = dir('*.txt');
figure % Create scatter plot with P against r
for n= 1:length(files) % all the files
    name=files(n).name;
    M = readmatrix(name);
    p1 = loglog( M(:,1),M(:,2),'b');
    hold on
end

%C/r^n model
xvals = 0:0.01:10; % Grid of 0.01 spacing from 0 to 10
yvals = 15.86087./((xvals).^2); % Evaluate function on xvals
p2 = loglog(xvals, yvals,'black'); % Create line plot with yvals against xvals

% N = zeros(101,length(files));
% create N with all the corresponding r's by rows and P's by columns
for n= 1:length(files)
    name = files(n).name;
    M = readmatrix(name);
    M = M(:,2);
    N(:,n) = M;
end

% Create a matrix with all the mean P(r)
M = readmatrix(name);
A(:,1) = M(:,1);
mean = mean(N,2);
A(:,2) = mean;
p3 = loglog(A(:,1), A(:,2),'r'); % Create line plot with yvals against xvals

title('Combining Multiple Trials')
xlabel('r,m')
ylabel('P,W/m^2')
grid on
legend([p1,p2,p3],'P(r), all trials','C/r^n model', 'meanP(r)')
hold off
```




## Confidence Plot

```
figure
%C/r^n model
xvals = 0.1:0.1:10; % Grid of 0.01 spacing from 0 to 10
yvals = 15.86087./((xvals).^2); % Evaluate function on xvals
loglog(xvals, yvals,'black'); % Create line plot with yvals against xvals

% create N with all the corresponding r's by rows and P's by columns
for n= 1:length(files)
    name = files(n).name;
    M = readmatrix(name);
    N(:,n) = M(:,2);
    conf0  (n) = prctile(N(n,:),  0);
    conf25 (n) = prctile(N(n,:), 25);
    conf75 (n) = prctile(N(n,:), 75);
    conf100(n) = prctile(N(n,:),100);
end

% Create a matrix with all the mean P(r)
p3 = loglog(A(:,1), A(:,2),'r'); % mean plot
hold on

patch([xvals,fliplr(xvals)],[conf25,fliplr(conf75 )],'p','facealpha',0.4)
patch([xvals,fliplr(xvals)],[conf0 ,fliplr(conf100)],'r','facealpha',0.4)
% set(gca,'xscale', 'log', 'yscale', 'log')
loglog(xvals,yvals,'c')

title('Confidence Plot')
xlabel('r,m')
ylabel('P,W/m^2')
grid on
```

```
hold off
legend('MeanP(r)','50% Confidence','100% Confidence' ,'C/r^n model');
```

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