Coding Challenge 1 - Problem 1

Zach Swain, 3/1/18, All files available at https://www.github.com/zswain/MEEG332

Contents

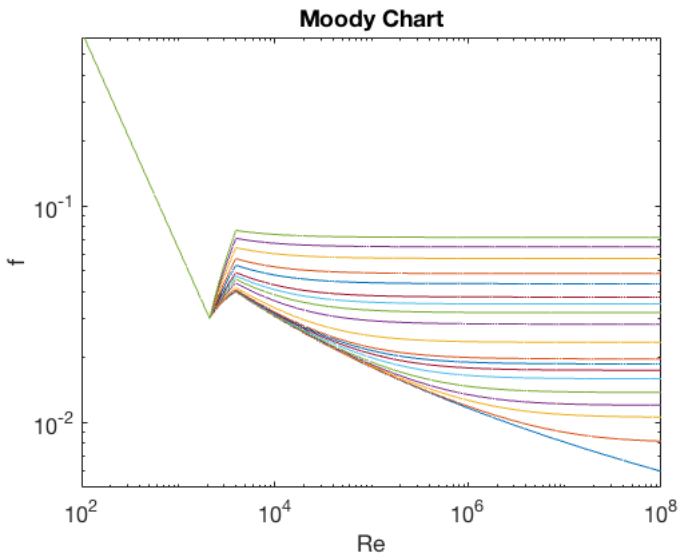

```
%Can't really publish a script after a function, so it's out of order
```

Script

```
clear all

Re= logspace(2,8,200);                  %define a range of 200 Re values from 1E2 to 1E8
relRough= [0 .00001 .00005 .0001 .0002 .0004 .0006 .0008 .001 .002 .004 .006 .008 .01 .015 .02 .03 .04 .05]; %define values from back of textbook
Re(45);                                 %used for determining Re=2000 index, left for later clarity
Re(54);                                 %used for determining Re=4000 index, left for later clarity

for i= 1:length(relRough)               %let i iterate through the defined ?/d values
    for j= 1:length(Re)                 %let j iterate through the defined Re values
        if Re(j)< 2000                  %if Re is laminar
            sol(j)= 64/Re(j);           %do laminar calculations
        end
        if Re(j)>= 2000 && Re(j)<4000   %if Re is transitional, do transitional calculations
            reBoundDif= Re(54)-Re(45); %difference b/w Re=4000 and Re=2000 proximal indices
            reDist= Re(j)-Re(45);       %distance Re(j) is from Re=2000
            perc= reDist/reBoundDif;    %percentage distance b/w Re=2000 & Re=4000
            fDif= ((fzero(@(f) (1/sqrt(f)+(2)*log10((relRough(i)/3.7)+(2.51/(Re(j)*sqrt(f))))),[.001 .1]))-(64/Re(45))); %difference b/w f@Re=4000 and
            sol(j)= (perc*fDif)+(64/Re(45)); %multiply the percent dist b/w Re values by the dif b/w f values, then add to f@Re=2000 to get f@Re(j)~tr
        end
        if Re(j)>= 4000                 %if Re is turbulent
            sol(j)= fzero(@(f) (1/sqrt(f)+(2)*log10((relRough(i)/3.7)+(2.51/(Re(j)*sqrt(f))))),[.001 .1]); %do turbulent calculations
        end
    end
    figure(1)
    loglog(Re,sol);                     %overlay plots of sol vs. Re for all epsilon/D iterations
    xlim([0 100000000])
    ylim([5*10^-3 6*10^-1])
    title('Moody Chart')
    xlabel('Re','Fontsize',16)
    ylabel('f','Fontsize',16)
    set(gca,'Fontsize',16)
    hold on
end
```



Function

```
darcyFactor(10^4, .01)        % ~PART A1~
darcyFactor(10^7, .01)        % ~PART A2~
darcyFactor(10^7,0)           % ~PART A3~

function [f] = darcyFactor(Re,relRough)

if Re< 2000                   %if Re is laminar
    f= 64/Re;                 %do laminar calculations
end
```

```
if Re>= 2000 && Re<4000       %if Re is transitional, do transitional calculations
    reBoundDif= 2000;         %difference b/w Re=4000 and Re=2000
    reDist= Re-2000;          %get difference between given Re and Re=2000
    perc= reDist/reBoundDif;  %get the given Re's percentage distance between Re=2000 and Re=4000
    fDif= ((fzero(@(f) (1/sqrt(f)+(2)*log10((relRough/3.7)+(2.51/(4000*sqrt(f))))),[.001 .1]))-(64/2000)); %get difference b/w f@Re=4000 and f@Re=2000
    f= (perc*fDif)+(64/2000); %multiply the percent dist b/w Re values by the dif b/w f values then add to f@Re=2000 to get f@Re~transitional~
end
if Re>= 4000                  %if Re is turbulent, do turbulent calculations
    f= fzero(@(f) (1/sqrt(f)+(2)*log10((relRough/3.7)+(2.51/(Re*sqrt(f))))),[.001 .1]); %solve Colebrook eq
end
end
```

```
ans =

    0.0431


ans =

    0.0379


ans =

    0.0081
```

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