Homework1(HW1.m)

Write a MATLAB program to read the numerical and analytical solutions in table (1) from excel sheet file to calculate the mean of the numerical values, “Qurter,Hourly,Simidiurnal,Diurnal”

Note: use an Excel spreadsheet to reading and writing values. Then draw each of numerical values versus the time steps.

```
clear all , clc
[A date]=xlsread('long_w.xlsx');
C=A(:,3);                % Read data
h=0;                      % new index for the new values
n=numel(C);              % number of elements in the excel sheet
Time=date(3:end,2);
formatIn={'mm/dd/yyyy HH:MM:SS AM'}
%dt = datestr(now,'mmmm dd, yyyy HH:MM:SS.FFF AM')
dt=datenum(Time,formatIn);
yy=year(dt);mm=month(dt);dd=day(dt);hr=hour(dt);mint=minute(dt);
%%%%%%%Hourly Mean %%%%%%%%%%
h=0;
for i=1:n-1
    if hr(i)==hr(i+1)
        continue
    else
        h=h+1;
```

```
        index=find(hr==hr(i-1)&dd==dd(i-1)&mm==mm(i-1)&yy==yy(i-1));
        C_4(h)=nanmean(C(index));
        HH(h)=hr(i-1);d1(h)=dd(i-1);m1(h)=mm(i-1);y1(h)=yy(i-1);
        datevector_hourly(h,:)=[y1(h) m1(h) d1(h) HH(h) 0 0];
    end
end
    index=find(hr==hr(n)&dd==dd(n)&mm==mm(n)&yy==yy(n))
    C_4(h+1)=nanmean(C(index));
    HH(h+1)=hr(n);d1(h+1)=dd(n);m1(h+1)=mm(n);y1(h+1)=yy(n);
    datevector_hourly(h+1,:)=[y1(h+1) m1(h+1) d1(h+1) HH(h+1) 0 0];
    %%%%%%% Daily Mean %%%%%%%%%
    h=0;
    for i=1:n-1
    if dd(i)==dd(i+1)
        continue
    else
        h=h+1;
        index=find(dd==dd(i-1)&mm==mm(i-1)&yy==yy(i-1));
        C_24(h)=nanmean(C(index));
        DD(h)=dd(i-1);m1(h)=mm(i-1);y1(h)=yy(i-1);
        datevector_daily(h,:)=[y1(h) m1(h) DD(h) 0 0 0];
    end
    end
```

```
    index=find(dd==dd(n)&mm==mm(n)&yy==yy(n))
    C_24(h+1)=nanmean(C(index));
    DD(h+1)=dd(n);m1(h+1)=mm(n);y1(h+1)=yy(n);
    datevector_daily(h+1,:)=[y1(h+1) m1(h+1) DD(h+1) 0 0 0];
filename='long_w.xlsx';
sheet = 2;
label={'year','month','day','hour','Hourly-DATA'};
xlswrite(filename,label,sheet,'A1')
xlswrite(filename,datevector_hourly(:,1:4),sheet,'A2')
xlswrite(filename,C_4',sheet,'E2')
sheet=3;
label2={'year','month','day','Daily-DATA'};
xlswrite(filename,label2,sheet,'A1')
xlswrite(filename,datevector_daily(:,1:3),sheet,'A2')
xlswrite(filename,C_24',sheet,'D2')
%%%% PLOT
d=datenum(Time);
d1=datenum(datevector_hourly);
d2=datenum(datevector_daily);
% datenum :Convert date and time to serial date number
figure(1)
hold on
plot(d,C,'.:B')
```

```
plot(d1,C_4','.:G')

plot(d2,C_24','R')

datetick('x','mmm-DD','keepticks')

xlabel('Time(hr)')

ylabel('LongWave Solar Radiation (W/m^2)')

title('Long Wave Solar Radiation')

legend('QURTER','HOURLY','DAILY')
```

Homework2 (HW2.m)

Write a MATLAB program to read data for Aerosol Optical Depth from Excel spreadsheet file AOD.xlsx to calculate the mean of monthly, seasonal and yearly.

```
% This is a program to calculate mean of monthly, seasonal and yearly data.
clear all,clc
[num txt]=xlsread('AOD.xlsx');
date=txt(2:end,1);
formatIn = 'mm/dd/yyyy';
t=datenum(date,formatIn);
c1=find(num==-9999);
t(c1)=[];num(c1)=[];
y=year(t);m=month(t);d=day(t);
AOD=num;
%%%%%% MEAN OF MONTHLY DATA %%%%%%
 h=0; % new index for the new values
for yy=2000:2016 % for yy=y(1):y(end)
   h=h+1;
   for mo=1:12
   in=find(y==yy);
   in1=find(m(in)==mo);
   monthly(h,mo)=nanmean(AOD(in1));
    end
```

```
 end
 filename='AOD.xlsx'; sheet=2;
dd={'Jan','Feb','Mar','Apr','May','Jun','Jul','Aug','Sep','Oct','Nov','Dec'};
xlswrite(filename,dd,sheet,'b1')
xlswrite(filename,{'YEAR'},sheet,'A1')
xlswrite(filename,[2000:2016]',sheet,'a2')
xlswrite(filename,monthly,sheet,'B2')
%%%%%% MEAN OF SEASONAL DATA %%%%%%
winter=nanmean(monthly(:,[12,1,2])');
winter=winter';
spring=nanmean(monthly(:,[3,4,5])');
spring=spring';
summer=nanmean(monthly(:,[6,7,8])');
summer=summer';
autumn=nanmean(monthly(:,[9,10,11])');
autumn=autumn';
sheet=3;
ddd={'YEAR','Winter','Spring','Summer','Autumn'};
aa=[winter,spring,summer,autumn];
xlswrite(filename,ddd,sheet,'A1')
xlswrite(filename,[2000:2016]',sheet,'a2')
xlswrite(filename,aa,sheet,'b2')
%%%%%% MEAN OF YEARLY DATA %%%%%%
```

```
h=0;
for yy=2000:2016
    h=h+1;
   in=find(y==yy);
   yearly_mean(h)=nanmean(AOD(in));
end
sheet=4;
xlswrite(filename,{'YEAR'},sheet,'A1')
xlswrite(filename,[2000:2016]',sheet,'a2')
xlswrite(filename,{'AOD'},sheet,'B1')
xlswrite(filename,yearly_mean',sheet,'B2')
%%%%%%%%%%%%%%%%%%%%%%%%%
```