% Load the data

data1 = readtable('C:\Users\CC\Desktop\A题第一小问\station1\_hourly\_data.xlsx'); % Please replace with actual file path

data2 = readtable('C:\Users\CC\Desktop\A题第一小问\station2\_hourly\_data.xlsx');

data3 = readtable('C:\Users\CC\Desktop\A题第一小问\station3\_hourly\_data.xlsx');

data4 = readtable('C:\Users\CC\Desktop\A题第一小问\station4\_hourly\_data.xlsx');

% Calculate the theoretical energy generation

% Assume the conversion efficiency is 1, and the installed capacity is 5000 kWp (adjust according to actual data)

installed\_capacity = 5000; % Installed capacity in kWp

conversion\_efficiency = 1; % Assume conversion efficiency is 1

% Theoretical energy generation = Irradiance \* Installed capacity \* Conversion efficiency

data1.TheoreticalEnergy\_kWh = data1.Irradiance\_w\_m2 \* installed\_capacity \* conversion\_efficiency;

data2.TheoreticalEnergy\_kWh = data2.Irradiance\_w\_m2 \* installed\_capacity \* conversion\_efficiency;

data3.TheoreticalEnergy\_kWh = data3.Irradiance\_w\_m2 \* installed\_capacity \* conversion\_efficiency;

data4.TheoreticalEnergy\_kWh = data4.Irradiance\_w\_m2 \* installed\_capacity \* conversion\_efficiency;

% Calculate PR (Performance Ratio)

data1.PR = data1.ActualEnergy\_kWh ./ data1.TheoreticalEnergy\_kWh;

data2.PR = data2.ActualEnergy\_kWh ./ data2.TheoreticalEnergy\_kWh;

data3.PR = data3.ActualEnergy\_kWh ./ data3.TheoreticalEnergy\_kWh;

data4.PR = data4.ActualEnergy\_kWh ./ data4.TheoreticalEnergy\_kWh;

% Calculate the difference between actual energy and theoretical energy

data1.EnergyDifference = data1.TheoreticalEnergy\_kWh - data1.ActualEnergy\_kWh;

data2.EnergyDifference = data2.TheoreticalEnergy\_kWh - data2.ActualEnergy\_kWh;

data3.EnergyDifference = data3.TheoreticalEnergy\_kWh - data3.ActualEnergy\_kWh;

data4.EnergyDifference = data4.TheoreticalEnergy\_kWh - data4.ActualEnergy\_kWh;

% Plot the graphs: 5 graphs for each station

figure;

subplot(5, 1, 1); plot(data1.Hour, data1.PR); title('Station 1 PR Value'); xlabel('Time'); ylabel('PR Value');

subplot(5, 1, 2); plot(data1.Hour, data1.EnergyDifference); title('Station 1 Energy Difference'); xlabel('Time'); ylabel('Difference (kWh)');

subplot(5, 1, 3); plot(data1.Hour, data1.Irradiance\_w\_m2); title('Station 1 Irradiance'); xlabel('Time'); ylabel('Irradiance (W/m²)');

subplot(5, 1, 4); plot(data1.Hour, data1.CurrentTemperature); title('Station 1 Current Temperature'); xlabel('Time'); ylabel('Temperature (°C)');

subplot(5, 1, 5); plot(data1.Hour, data1.Humidity); title('Station 1 Humidity'); xlabel('Time'); ylabel('Humidity (%)');

figure;

subplot(5, 1, 1); plot(data2.Hour, data2.PR); title('Station 2 PR Value'); xlabel('Time'); ylabel('PR Value');

subplot(5, 1, 2); plot(data2.Hour, data2.EnergyDifference); title('Station 2 Energy Difference'); xlabel('Time'); ylabel('Difference (kWh)');

subplot(5, 1, 3); plot(data2.Hour, data2.Irradiance\_w\_m2); title('Station 2 Irradiance'); xlabel('Time'); ylabel('Irradiance (W/m²)');

subplot(5, 1, 4); plot(data2.Hour, data2.CurrentTemperature); title('Station 2 Current Temperature'); xlabel('Time'); ylabel('Temperature (°C)');

subplot(5, 1, 5); plot(data2.Hour, data2.Humidity); title('Station 2 Humidity'); xlabel('Time'); ylabel('Humidity (%)');

figure;

subplot(5, 1, 1); plot(data3.Hour, data3.PR); title('Station 3 PR Value'); xlabel('Time'); ylabel('PR Value');

subplot(5, 1, 2); plot(data3.Hour, data3.EnergyDifference); title('Station 3 Energy Difference'); xlabel('Time'); ylabel('Difference (kWh)');

subplot(5, 1, 3); plot(data3.Hour, data3.Irradiance\_w\_m2); title('Station 3 Irradiance'); xlabel('Time'); ylabel('Irradiance (W/m²)');

subplot(5, 1, 4); plot(data3.Hour, data3.CurrentTemperature); title('Station 3 Current Temperature'); xlabel('Time'); ylabel('Temperature (°C)');

subplot(5, 1, 5); plot(data3.Hour, data3.Humidity); title('Station 3 Humidity'); xlabel('Time'); ylabel('Humidity (%)');

figure;

subplot(5, 1, 1); plot(data4.Hour, data4.PR); title('Station 4 PR Value'); xlabel('Time'); ylabel('PR Value');

subplot(5, 1, 2); plot(data4.Hour, data4.EnergyDifference); title('Station 4 Energy Difference'); xlabel('Time'); ylabel('Difference (kWh)');

subplot(5, 1, 3); plot(data4.Hour, data4.Irradiance\_w\_m2); title('Station 4 Irradiance'); xlabel('Time'); ylabel('Irradiance (W/m²)');

subplot(5, 1, 4); plot(data4.Hour, data4.CurrentTemperature); title('Station 4 Current Temperature'); xlabel('Time'); ylabel('Temperature (°C)');

subplot(5, 1, 5); plot(data4.Hour, data4.Humidity); title('Station 4 Humidity'); xlabel('Time'); ylabel('Humidity (%)');