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```
%WAVE Matlab Processor  
%Dominic Nocon 2022
```

```
clc  
clear  
close all  
warning off
```

Import Data

```
data = readmatrix('WaveData_03.23.2022.xlsx');  
rpm = data(1:end,2); %rpm column [rpm]  
torque = data(1:end, 3)./1.356; %torque column convert nm to ftlbs [ft-lbs]  
manifold_Pressure = data(1:end, 4)./1000; %plenum pressure column [kPa]  
throttle_Pos = (data(1:end,5)./90).*100; %throttle position deg turned to [%]  
manifold_Eff = data(1:end, 6)*100; %manifold referenced VE [%]  
ambient_Eff = data(1:end, 7)*100; %ambient referenced VE [%]
```

Set Graph Bounds

```
graphDensity = 20; %how many points you have on your x and y axis for calculations  
x_bound_rpm = linspace(min(rpm), max(rpm), graphDensity); %set graph lines for rpm  
y_bound_pres = linspace(0, max(manifold_Pressure), graphDensity); %set graph lines for manifold pressure  
y_bound_tor = linspace(min(torque), max(torque), graphDensity);  
fprintf('0: Setup Complete\n');
```

```
0: Setup Complete
```

Sift Data and Build Tables

```
%Manifold Referenced VE vs. Pressure vs. RPM  
r = 1;  
c = 1;  
Output_WAVE_VEmani = zeros([length(x_bound_rpm) length(y_bound_pres)]); %preallocate array for speed  
for x = x_bound_rpm  
    for y = y_bound_pres  
        Output_WAVE_VEmani(r,c) = griddata(rpm, manifold_Pressure, manifold_Eff, x, y, 'nearest'); %ok<*GRIDD>  
        r = r+1;  
    end  
    r = 1;  
    c = c+1;  
end  
fprintf('1: Manifold Ref VE vs. Pressure vs. RPM Complete\n');
```



```
%Ambient Referenced VE vs. Pressure vs. RPM  
r = 1;  
c = 1;
```

```

Output_WAVE_VEamb = zeros([length(x_bound_rpm) length(y_bound_pres)]); %preallocate array for speed
for x = x_bound_rpm
    for y = y_bound_pres
        Output_WAVE_VEamb(r,c) = griddata(rpm, manifold_Pressure, ambient_Eff, x, y, 'nearest');
        r = r+1;
    end
    r = 1;
    c = c+1;
end
fprintf('2: Ambient Ref VE vs. Pressure vs. RPM Complete\n');

%Torque vs. Pressure vs. RPM
r = 1;
c = 1;
Output_WAVE_Torque = zeros([length(x_bound_rpm) length(y_bound_pres)]); %preallocate array for speed
for x = x_bound_rpm
    for y = y_bound_pres
        Output_WAVE_Torque(r,c) = griddata(rpm, manifold_Pressure, torque, x, y, 'nearest');
        r = r+1;
    end
    r = 1;
    c = c+1;
end
fprintf('3: Torque vs. Pressure vs. RPM Complete\n');

%Throttle vs. Pressure vs. RPM
r = 1;
c = 1;
Output_WAVE_Throttle = zeros([length(x_bound_rpm) length(y_bound_pres)]); %preallocate array for speed
for x = x_bound_rpm
    for y = y_bound_pres
        Output_WAVE_Throttle(r,c) = griddata(rpm, manifold_Pressure, throttle_Pos, x, y, 'linear');
        r = r+1;
    end
    r = 1;
    c = c+1;
end
fprintf('4: Throttle vs. Pressure vs. RPM Complete\n');

%Throttle vs. Torque vs. RPM
r = 1;
c = 1;
Output_WAVE_Throttle_tor = zeros([length(x_bound_rpm) length(y_bound_pres)]); %preallocate array for speed
for x = x_bound_rpm
    for y = y_bound_tor
        Output_WAVE_Throttle_tor(r,c) = griddata(rpm, torque, throttle_Pos, x, y, 'linear');
        r = r+1;
    end
    r = 1;
    c = c+1;
end
fprintf('5: Throttle vs. Torque vs. RPM Complete\n');

```

- 1: Manifold Ref VE vs. Pressure vs. RPM Complete
- 2: Ambient Ref VE vs. Pressure vs. RPM Complete
- 3: Torque vs. Pressure vs. RPM Complete
- 4: Throttle vs. Pressure vs. RPM Complete
- 5: Throttle vs. Torque vs. RPM Complete

Plot Results

```

figure()
surf(x_bound_rpm, y_bound_pres, Output_WAVE_VEmani);
title('Manifold Referenced VE (WAVE)');
xlabel('RPM');
ylabel('Manifold Pressure (kPa)');
zlabel('%');

figure()
surf(x_bound_rpm, y_bound_pres, Output_WAVE_VEamb);
title('Ambient Referenced VE (WAVE)');
xlabel('RPM');
ylabel('Manifold Pressure (kPa)');
zlabel('%');

figure()
surf(x_bound_rpm, y_bound_pres, Output_WAVE_Torque);
title('Torque (WAVE)');
xlabel('RPM');
ylabel('Manifold Pressure (kPa)');
zlabel('Ft-Lbs');

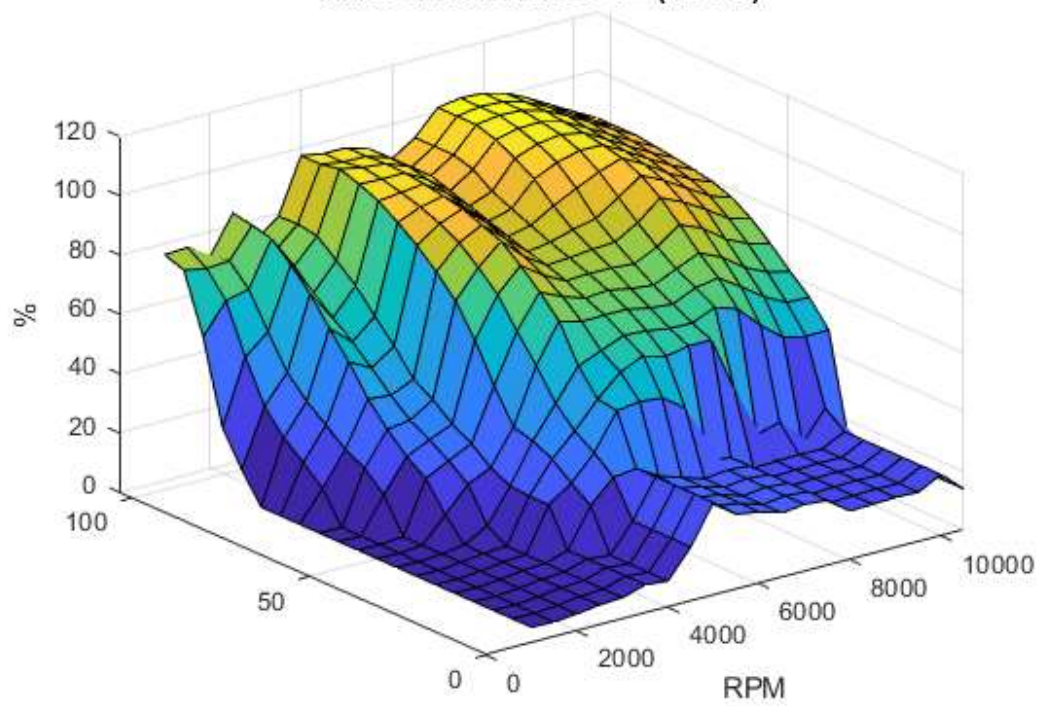
figure()
surf(x_bound_rpm, y_bound_pres, Output_WAVE_Torque);
xlim([x_bound_rpm(1,1) x_bound_rpm(1,end)]);
hold on;
plot3(rpm, manifold_Pressure, torque, 'o');
title('Torque (WAVE) showing raw points');
xlabel('RPM');
ylabel('Manifold Pressure (kPa)');
zlabel('Ft-Lbs');
hold off;

figure()
plot(Output_WAVE_Throttle, y_bound_pres, 'k');
%surf(x_bound, y_bound, Output_WAVE_Throttle);
title('Throttle Position vs. Manifold Pressure (WAVE)');
xlabel('Throttle (%)');
ylabel('Manifold Pressure (kPa)');

figure()
plot(Output_WAVE_Throttle_tor, y_bound_tor, 'k');
%surf(x_bound, y_bound, Output_WAVE_Throttle);
title('Throttle Position vs. Torque (WAVE)');
xlabel('Throttle (%)');
ylabel('Torque (ft-lbs)');

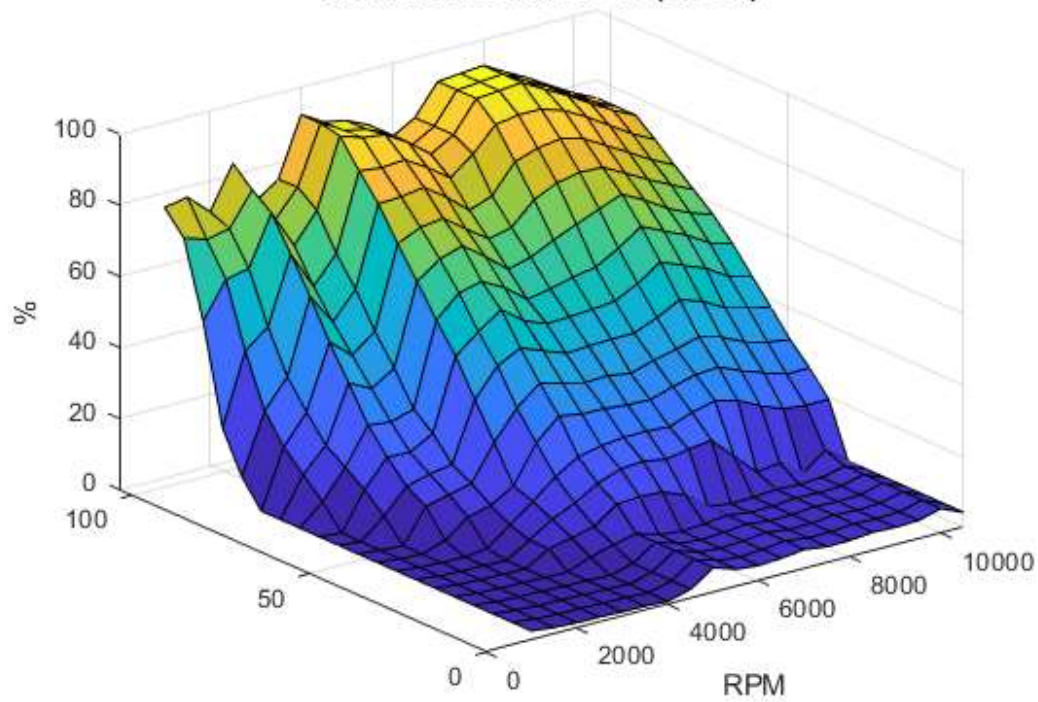
```

Manifold Referenced VE (WAVE)



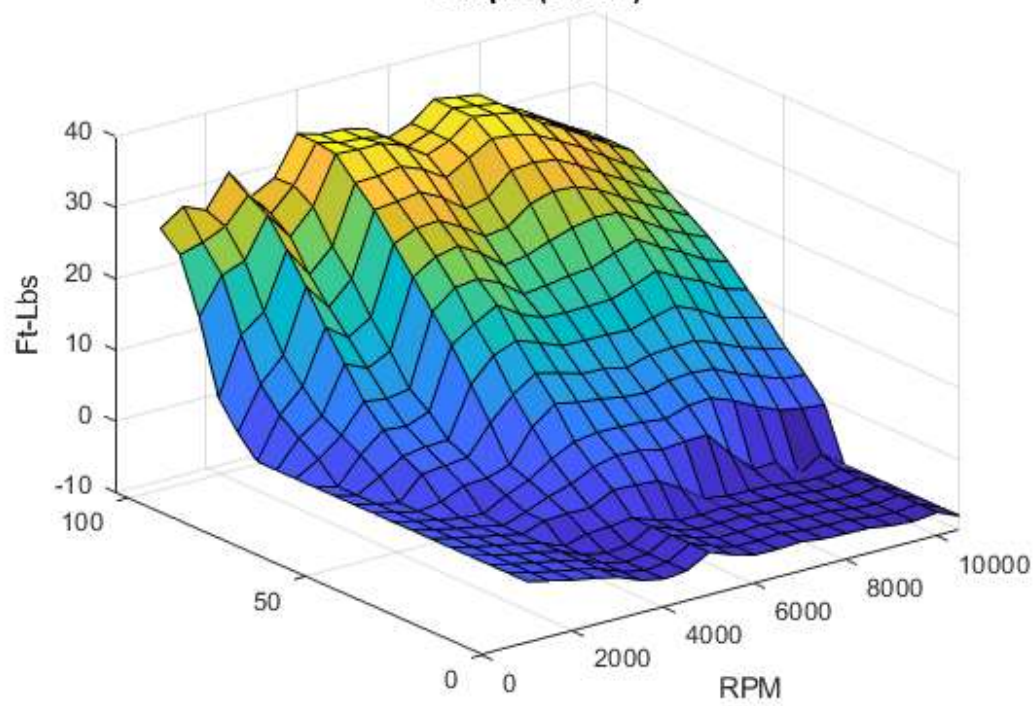
Manifold Pressure (kPa)

Ambient Referenced VE (WAVE)



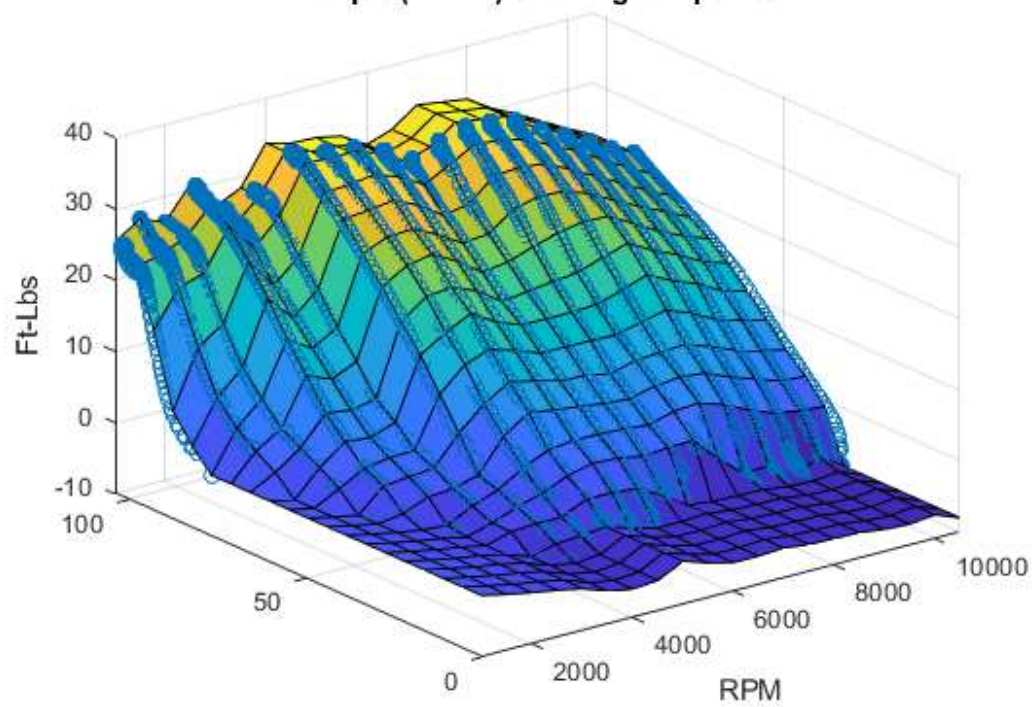
Manifold Pressure (kPa)

Torque (WAVE)



Manifold Pressure (kPa)

Torque (WAVE) showing raw points



Manifold Pressure (kPa)

