%%

m\_leer = 1750;

m\_lade = 2150;

f\_r = 0.008;

A = 2.3;

C\_w = 0.28;

r = 0.33;

lambda = 1.04;

F\_r = 80;

i\_AG = 4;

eta\_G = 0.95;

eta\_AG = 0.95;

g = 9.81;

rho = 1.225;

M\_loss\_mot\_grid = PSM.P\_loss\_mot\_grid\*1000./(PSM.loss\_grid\_n\*2\*pi/60);

M\_loss\_gen\_grid = PSM.P\_loss\_gen\_grid\*1000./(PSM.loss\_grid\_n\*2\*pi/60);

M\_loss\_mot\_grid(1,:) = M\_loss\_mot\_grid(2,:);

M\_loss\_gen\_grid(1,:) = M\_loss\_gen\_grid(2,:);

M\_loss\_mot\_grid(1,1) = 0;

M\_loss\_gen\_grid(1,1) = 0;

WLTP = [t,v];

%%

% 1.1PSM

plot(PSM.full\_load\_n,PSM.full\_load\_M\_mot);

hold on

plot(PSM.full\_load\_n,PSM.full\_load\_M\_gen);

hold on

xlabel("Drehzahl [u/min]");

ylabel("Drehmoment [Nm]");

[C,h] = contour(PSM.loss\_grid\_n,PSM.loss\_grid\_M,(PSM.loss\_grid\_M./(PSM.loss\_grid\_M+(PSM.P\_loss\_mot\_grid\*1000)./(PSM.loss\_grid\_n\*2\*pi/60))));

h.ShowText = 1;

h.LabelSpacing = 10000;

hold on

[C,h] = contour(PSM.loss\_grid\_n,-PSM.loss\_grid\_M,((-PSM.loss\_grid\_M+(PSM.P\_loss\_gen\_grid\*1000)./(PSM.loss\_grid\_n\*2\*pi/60))./(-PSM.loss\_grid\_M)));

h.ShowText = 1;

h.LabelSpacing = 10000;

legend('Volllast motorisch','Volllast generatorisch','Wirkungsgrad motorisch','Wirkungsgrad generatorisch');

%%

% 1.1ASM

plot(ASM.full\_load\_n,ASM.full\_load\_M\_mot);

hold on

plot(ASM.full\_load\_n,ASM.full\_load\_M\_gen);

hold on

xlabel("Drehzahl [u/min]");

ylabel("Drehmoment [Nm]");

[C,h] = contour(ASM.loss\_grid\_n,ASM.loss\_grid\_M,(ASM.loss\_grid\_M./(ASM.loss\_grid\_M+(ASM.P\_loss\_mot\_grid\*1000)./(ASM.loss\_grid\_n\*2\*pi/60))));

h.ShowText = 1;

h.LabelSpacing = 10000;

hold on

[C,h] = contour(ASM.loss\_grid\_n,-ASM.loss\_grid\_M,((-ASM.loss\_grid\_M+(ASM.P\_loss\_gen\_grid\*1000)./(ASM.loss\_grid\_n\*2\*pi/60))./(-ASM.loss\_grid\_M)));

h.ShowText = 1;

h.LabelSpacing = 10000;

legend('Volllast motorisch','Volllast generatorisch','Wirkungsgrad motorisch','Wirkungsgrad generatorisch');

%%

%1.2

% 180 km/h

Z\_2 = f\_r\*m\_leer\*g + F\_r + C\_w\*A\*(rho/2)\*(160/3.6)^2;

M\_rad\_2 = Z\_2\*r;

n\_rad = 180/(3.6\*2\*pi\*r);

i\_G2 = (15600/60)/(n\_rad\*i\_AG);

M\_mot = 87.2925;

i\_G3 = M\_rad\_2/(M\_mot\*i\_AG\*eta\_AG\*eta\_G);

%%

%1.3

Z = f\_r\*m\_leer\*g + F\_r + C\_w\*A\*(rho/2)\*(120/3.6)^2;

M = Z\*r;

M\_motor = M/(i\_AG\*i\_G2\*eta\_G\*eta\_AG);

n\_rad120 = 120\*60/(3.6\*2\*pi\*r);

n\_mot120 = n\_rad120\*i\_AG\*i\_G2;

P = M\_motor\*n\_mot120\*2\*pi;

%PSM

M\_PSM = 103.9917;

P\_PSM = M\_PSM\*n\_rad120\*2\*pi/60;

%ASM

M\_ASM = 34.158;

P\_ASM = M\_ASM\*n\_rad120\*2\*pi/60;

%%

%1.4!

M\_mot\_max = 450;

M\_rad\_max = M\_mot\_max\*eta\_AG\*eta\_G\*i\_AG\*i\_G2;

P\_emax = 220000;

n\_k = P\_emax\*60/(M\_mot\_max\*2\*pi);

v\_k = n\_k\*2\*pi\*r\*3.6/(60\*i\_AG\*i\_G2);

v\_sum = linspace(v\_k,15600\*2\*pi\*r\*3.6/(60\*i\_AG\*i\_G2));

n\_mot\_sum = v\_sum\*i\_AG\*i\_G2\*60/(3.6\*2\*pi\*r);

M\_mot\_sum = P\_emax\*60./(2\*pi\*n\_mot\_sum);

plot(v\_sum,M\_mot\_sum);

line([0,v\_k],[M\_mot\_max,M\_mot\_max]);

line([180,180],[0,134.7]);

xlabel("Geschwindigkeit [km/h]");

ylabel("Drehmoment [Nm]");

xlim([0 200]);

ylim([0 500]);

%%

v\_SUM = linspace(0,15600\*2\*pi\*r\*3.6/(60\*i\_AG\*i\_G2));

n\_mot\_SUM = v\_SUM\*i\_AG\*i\_G2\*60/(3.6\*2\*pi\*r);

n\_k = v\_k\*i\_AG\*i\_G2\*60/(3.6\*2\*pi\*r);

M\_mot\_SUM = [];

for i = 1:length(n\_mot\_SUM)

if n\_mot\_SUM(i) <= n\_k

M\_mot\_SUM = [M\_mot\_SUM,450];

else

M\_mot\_SUM = [M\_mot\_SUM,P\_emax\*60/(2\*pi\*n\_mot\_SUM(i))];

end

end

%%

%1.5

a = [0];

for i = 1:length(v)-1

a = [a,(v(i+1)/3.6-v(i)/3.6)/(t(i+1)-t(i))];

end

Z\_rad = f\_r\*m\_leer\*g + F\_r + C\_w\*A\*(rho/2)\*(v/3.6).^2+lambda\*m\_leer\*a';

M\_rad\_wltp = Z\_rad\*r;

M\_mot\_wltp = M\_rad\_wltp/(i\_AG\*i\_G2\*eta\_AG\*eta\_G);

v\_gr = [];

M\_wltp\_max = [];

for v\_car = 0:0.1:180

M\_wltp\_v = [];

for i = 1:length(v)

if v(i) == v\_car

M\_wltp\_v = [M\_wltp\_v,M\_mot\_wltp(i)];

end

end

M\_max\_v = max(M\_wltp\_v);

if M\_max\_v >= 0

M\_wltp\_max = [M\_wltp\_max,M\_max\_v];

if length(M\_wltp\_v) > 0

v\_gr = [v\_gr,v\_car];

end

end

end

M\_FPS\_1 = [];

M\_wltp\_gr = M\_wltp\_max\*1.1;

for i = 1:length(v\_gr)

if v\_gr(i) < v\_k

M\_FPS\_1 = [M\_FPS\_1,M\_mot\_max];

else

M\_FPS\_1 = [M\_FPS\_1,interp1(v\_sum,M\_mot\_sum,v\_gr(i))];

end

end

FPS = M\_wltp\_gr./M\_FPS\_1;

plot(v\_gr,FPS);

hold on

FPS\_z = [0.28364,0.266105];

v\_gr\_z = [25.1,113.7];

a = (0.28364-0-0.266105)/(25.1-113.7);

b = 0.28364-a\*25.1;

v\_Gr = [v\_gr,linspace(v\_gr(length(v\_gr)),180)];

%plot(v\_Gr,a\*v\_Gr+b,'red');

a1 = 0.0003;

b1 = 0.27611;

plot(v\_Gr,a1\*v\_Gr+b1,'red');

ylabel('Fahrpedalstellung');

xlabel('Geschwindigkeit [km/h]');