
```

#####
function velconst%(vel)
%syoki = [g1,g2,g3,syoki_sr,alpha1,alpha2];
%para = [0,0,0,0,10,25];
vel = 10;
para = [0 ,0,0 ,0,3,2];
options=[];
v=vel;
alpha1=para(5);
alpha2=para(6);
%x_syoki = [beta,dpsi,v ,th,
    s,z,betad,dpsid,thd,zd,realth,xd,yd,thki,xki,yki];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%x_syoki = [0,0,10,0,0,3,0,0,0,3,0,0,3,0,0,0];
x_syoki = [0.3,0,10,0,0,3,0,0,0,3,0,0,3,0,0,0];
%x_syoki = [0 ,0 ,v,0 ,0 ,0,0 ,0 ,0 ,0 ,0 ,0 ];
etime = 300/v;
%x_syoki=[1;1;0];
[t,x]=ode45(@main,0:0.01:etime,x_syoki,options,para);
figure(2)
plot(x(:,5),x(:,6),'k')
figure(1)
plot(x(:,12),x(:,13),'k-','LineWidth',0.5)
hold on
plot(x(:,15),x(:,16),'k-.','LineWidth',0.5)
axis([-20 95 -3 102])
xlabel('X [m]')
ylabel('Y [m]')
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% #####
#####
%figure(5)
%plot(x(:,5),x(:,1))
%hold on
function xd = main(t,x,para)

xd=zeros(16,1);
    g1 = para(1);
    g2 = para(2);
    g3 = para(3);
    %str_kappa = kappa_fun2(para(4),x(5));
    str_kappa = kappa_fun(para(4),x(5));
    kappa = str_kappa(1);
    % kdash = str_kappa(2);
    % gamma = kdash;
    beta = x(1); %% ##### beta ###
    dpsi = x(2); %% ##### psidot ###
    v = x(3);
    th = x(4);
    sr = x(5);
    z = x(6);
    betad = x(7); %% ##### beta ###
    dpsid = x(8); %% ##### psidot ###

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thd = x(9);
zd = x(10);
    realth = x(11);
    xreal = x(12);
    yreal = x(13);
    thki = x(14);
    xki = x(15);
    yki = x(16);
co = cos(th);
si = sin(th);
ta = tan(th);
    cod = cos(thd);
    sid = sin(thd);
    tad = tan(thd);
    Kfd = 45372.9;
    Krd = 74405.5;
    lrd = 1.122;
    lfd = 1.428;
    Id = 2205;
    md = 1507;
    alpha = 0.2;
    la = 0.3;
    lb = 0.5;
    lc = 1.6;
    mh = 60;
    mn = 100;
    lr = lrd;
    lf = lfd;
    locationm = [1;0;0;0;1];
    mfd = [mh*(lr+la)/(lf+lr) mh*(lr+la)/(lf+lr) mh*(lr-lb)/(lf+lr)
mh*(lr-lb)/(lf+lr) mn*(lr-lc)/(lf+lr)]*locationm;
    mrd = [mh*(lr-la)/(lf+lr) mh*(lr-la)/(lf+lr) mh*(lr+lb)/(lf+lr)
mh*(lr+lb)/(lf+lr) mn*(lr+lc)/(lf+lr)]*locationm;
    Kf = Kfd*(1-alpha)*(1+mfd/md);%*(1-0.2);
    Kr =Krd*(1-alpha)*(1+mrd/md);
    I = Id+[mh*la^2 mh*la^2 mh*lb^2 mh*lb^2 mn*lc^2]*locationm;
    m = md+[mh mh mh mh mn]*locationm;
a11 = -(Kf+Kr)/m;
a12 = (-lf*Kf+lr*Kr)/m;
a13 = Kf/m;
a21 = (-lf*Kf+lr*Kr)/I;
a22 = -(lf^2*Kf+lr^2*Kr)/I;
a23 = lf*Kf/I;
    a31 = -(Kf+Kr)/m;
a32 = (-lf*Kf+lr*Kr)/m;
a33 = Kf/m;
    a11d = -(Kfd+Krd)/md;
a12d = (-lfd*Kfd+lrd*Krd)/md;
a13d = Kfd/md;
a21d = (-lfd*Kfd+lrd*Krd)/Id;
a22d = -(lfd^2*Kfd+lrd^2*Krd)/Id;
a23d = lfd*Kfd/Id;
    a31d = -(Kfd+Krd)/md;
a32d = (-lfd*Kfd+lrd*Krd)/md;

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a33d = Kfd/md;
alpha1=para(5);
alpha2=para(6);

```

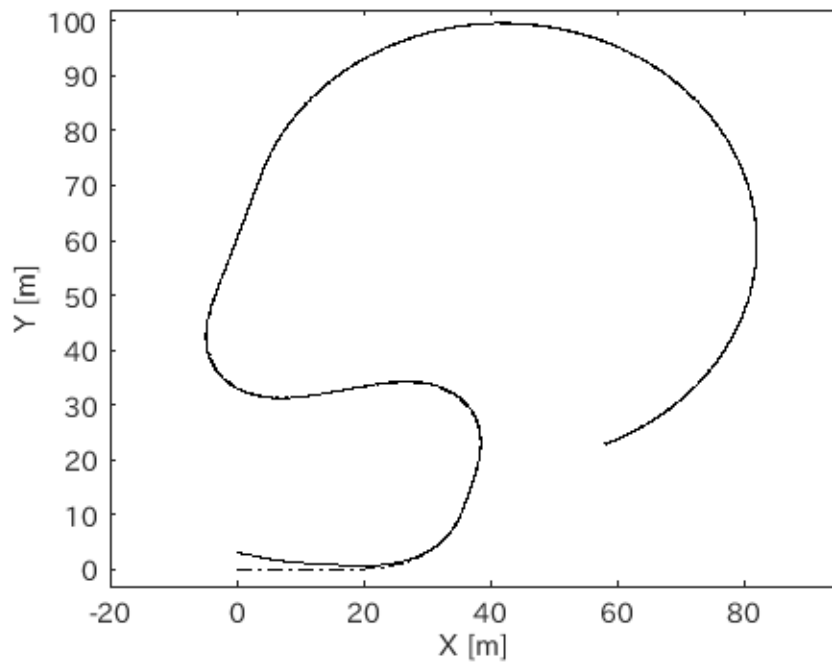
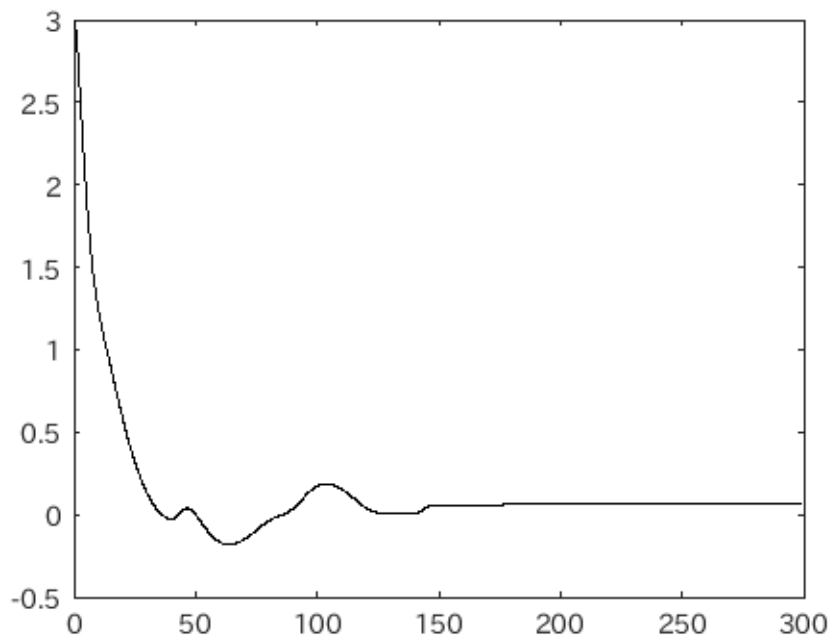
###

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%delta = -alpha1*v*tad/a13d-alpha2*zd/cod/a13d-a11d*betad/a13d-
a12d*(dpsid)/a13d/v+kappa*v^2*cod/a13d/(1-kappa*zd)+10*(v*tad/a13d-
v*ta/a13)+25*(zd/a13d/cod-z/a13/co);
delta = -alpha1*v*tad/a13d-alpha2*zd/cod/a13d-a11d*betad/a13d-
a12d*(dpsid)/a13d/v+kappa*v^2*cod/a13d/(1-kappa*zd)+alpha1*(v*tad/
a13d-v*ta/a13)+alpha2*(zd/a13d/cod-z/a13/co);%###
%delta = -alpha1*v*ta/a13d-alpha2*z/co/a13d-a11d*beta/a13d-
a12d*dpsi/a13d/v+kappa*v^2*co/a13d/(1-kappa*z); %#####
deltanom = -alpha1*v*tad/a13d-alpha2*zd/cod/a13d-a11d*betad/a13d-
a12d*(dpsid)/a13d/v+kappa*v^2*cod/a13d/(1-kappa*zd);

xd(1)=a11/v*beta+(a12/v/v-1)*dpsi+a13/v*delta;
xd(2)=a21*beta+a22/v*dpsi+a23*delta;
xd(3)=0;
xd(4)=a31/v*beta+a32/v/v*dpsi+a33/v*delta-kappa*v*co/(1-kappa*z);
xd(5)=v*co/(1-kappa*z);
xd(6)=v*si;
xd(7)=a11d/v*betad+(a12d/v/v-1)*dpsid+a13d/v*deltanom;
xd(8)=a21d*betad+a22d/v*dpsi+a23d*deltanom;
xd(9)=a31d/v*betad+a32d/v/v*dpsi+a33d/v*deltanom-kappa*v*cod/(1-
kappa*zd);
xd(10)=v*sid;
xd(11)=a31/v*beta+a32/v/v*dpsi+a33/v*delta;
xd(12)=v*cos(realth);
xd(13)=v*sin(realth);
xd(14)=kappa*v*cos(th)/(1-kappa*z);
xd(15)=v*cos(th)/(1-kappa*z)*cos(thki);
xd(16)=v*cos(th)/(1-kappa*z)*sin(thki);

```



```
function kd = kappa_fun(s1,s2)
    s = s2 + s1;#####
    kd = zeros(2,1);%kd1###kd2#####
    if s>140
    kd(1) = -0.025;
    elseif s>120
        kd(1) = 0;
    elseif s>80
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        kd(1) = -0.050*(1-cos(0.15*(s-80)));
elseif s>40
kd(1) = 0.050*(1-cos(0.15*(s-40)));
elseif s>(2*pi/0.15+12)
    kd(1)=0;
elseif s>12
kd(1) = 0.037*(1-cos(s*0.15-1.8));
%kd(2) = 0.037*0.15*sin(s*0.15-1.8);
%kd(1) = 0;
%kd(2) = 0;
else
kd(1)=0;
kd(2)=0;
end
```

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