%interlin1

%DATOS DE ENTRADA

m=100;

k=3947.8418;

z=0.10;

%Condiciones iniciales:

uo=0;

vo=0;

ao=0;

%Vector tiempo

dt=0.001;

ttotal=5;

t=0:dt:ttotal;

t1=0:0.001:1.5;

t2=1.501:0.001:5;

nstep=length(t);

P1=5333.33.\*t1;

P2=ones(1,length(t2)).\*8000;

Pt=[P1 P2];

%Vector que el pro. ponga

u=[];

v=[];

a=[];

w=sqrt(k/m);

wd=w\*sqrt(1-z^2);

firad=atan(uo\*w/vo); %rad

fi=firad\*180/pi; %gra

Tn=2\*pi/w;

Td=2\*pi/wd;

c=2\*z\*w\*m;

A=exp(-z\*w\*dt)\*(z/(sqrt(1-z^2))\*sin(wd\*dt)+cos(wd\*dt));

B=exp(-z\*w\*dt)\*(1/wd\*sin(wd\*dt));

C=1/k\*(2\*z/w/dt+exp(-z\*w\*dt)\*(((1-2\*z^2)/(wd\*dt)-(z/sqrt(1-z^2)))\*sin(wd\*dt)-(1+2\*z/w/dt)\*cos(wd\*dt)));

D=1/k\*(1-2\*z/w/dt+exp(-z\*w\*dt)\*(2\*z^2-1/wd/dt\*sin(wd\*dt)+2\*z/w/dt\*cos(wd\*dt)));

Ap=-exp(-z\*w\*dt)\*(w/sqrt(1-z^2)\*sin(wd\*dt));

Bp=exp(-z\*w\*dt)\*(cos(wd\*dt)-z/sqrt(1-z^2)\*sin(wd\*dt));

Cp=1/k\*(-1/dt+exp(-z\*w\*dt)\*((w/sqrt(1-z^2)+z/dt/sqrt(1-z^2))\*sin(wd\*dt)+1/dt\*cos(wd\*dt)));

Dp=1/k/dt\*(1-exp(-z\*w\*dt)\*(z/sqrt(1-z^2)\*sin(wd\*dt)+cos(wd\*dt)));

u(1)=uo;

v(1)=vo;

a(1)=ao;

for j=1:nstep-1

eval(['u(j+1)=A\*u(j)+B\*v(j)+C\*Pt(j)+D\*Pt(j+1) ;'])

eval(['v(j+1)=Ap\*u(j)+Bp\*v(j)+Cp\*Pt(j)+Dp\*Pt(j+1) ;'])

eval(['a(j+1)=(Pt(j)-c\*v(j+1)-k\*u(j+1))/m;'])

end

x=u';

xp=v';

xpp=a';

%GRAFICA

plot(t,x,t,xp,t,xpp)

grid on

legend('Despl','Vel','Acel')

xlabel('Tiempo (seg)')

ylabel('Amplitud')