VALUE OF CRITICAL K WAS COMING OUT TO BE 256 using standard deviation of r and 257 by K using standard deviation of theta\_dot

The code computed both K\_r and K\_c and plotted the graphs below

Lop5\_all.m

%lop 5

%k Vs r graph

%finding critical value of K = Kc

%Using both r and theta\_dot

%lop 5

%k Vs r graph

%finding critical value of K = Kc

%Using both r and theta\_dot

clear;

flag\_r = 0;

flag\_t = 0;

tol = 0.000001;

N=80;

T=1000;

tau=0.1;

r\_final = zeros(1,500);

r\_cos = zeros(1,T);

r\_sin = zeros(1,T);

theta = zeros(N,T);

theta\_dot = zeros(N,T);

w = random('Normal',0,1,1,N);

a = random('Normal',0,1,1,N);

for K = 1:1:500

for i=1:N

theta(1,i)=a(i);

theta\_dot(1,i) = w(i);

end

for i =1:N

for j = 1:N

r\_cos(1) = r\_cos(1) + (1/N)\*cos(theta(1,j)-theta(1,i));

r\_sin(1) = r\_sin(1) + (1/N)\*sin(theta(1,j)-theta(1,i));

end

end

r\_cos(1) = r\_cos(1)/N;

r\_sin(1) = r\_sin(1)/N;

for t=2:T

for i=1:N

theta(t,i) = theta(t-1,i) + tau\*theta\_dot(t-1,i);

theta(t,i) = mod(theta(t,i),2\*pi);

for j = 1:N

theta\_dot(t,i) = (w(i) + (K/N)\*sin(theta(t,j)-theta(t,i)));

end

end

for i =1:N

for j = 1:N

r\_cos(t) = r\_cos(t) + (1/N)\*cos(theta(t,j)-theta(t,i));

r\_sin(t) = r\_sin(t) + (1/N)\*sin(theta(t,j)-theta(t,i));

end

end

r\_cos(t) = r\_cos(t)/N;

r\_sin(t) = r\_sin(t)/N;

r(t) = sqrt(r\_cos(t)^2 + r\_sin(t)^2);

end

theta\_dot\_k(K,(1:80)) = theta\_dot(T,(1:80));

theta\_k(K,(1:80)) = theta(T,(1:80));

r\_final(K) = mean(r(T-50:T));

error1 = std(theta\_dot(T,(1:80)));

if(error1<tol && flag\_t==0)

Kc\_t = K;

flag\_t = flag\_t + 1;

end

error2 = std(r(T-50:T));

if(error2<tol && flag\_r ==0)

Kc\_r = K;

flag\_r = flag\_r + 1;

end

end

K = 1:1:500;

figure(1)

plot(K,theta\_dot\_k)



figure(2)

plot(K,theta\_k)



figure(3)

plot(K,r\_final)

