Y

Twiddle=F

Sumdp<tol

Param\_index=0,step=0

P[0],p[1],p[2]

dP[0],dp[1],dp[2]

Avg<best\_err

Y

Step > stable~~+best\_dist~~

&& (cte> 4.5 || speed<1.0)

N

Err +=cte\*\*2

dist=step

Avg=err/step-stable

Y

N

Step > stable

Twiddle??

Kp,Ki,Kd

N

Y

Step++

Increase\_p && dp\_increase

Y

Y

N

N

Best\_err=avg

dp[param\_index] \*=1.1

best\_dist=step

dp\_increased=T

p[param\_index] +=dp[param\_index]

dp[param\_index] \*=0.9

//increase\_p=true

dp\_increased=F

p[param\_index] -=2\*dp[param\_index]

increase\_p=false

//step=0

//err=0

param\_index++

p[param\_index] +=dp[param\_index]

increase\_p=true

//Best\_dist=dist

error=0,step=0,avg=0, Reset\_simulator

update Kp,Ki,Kd