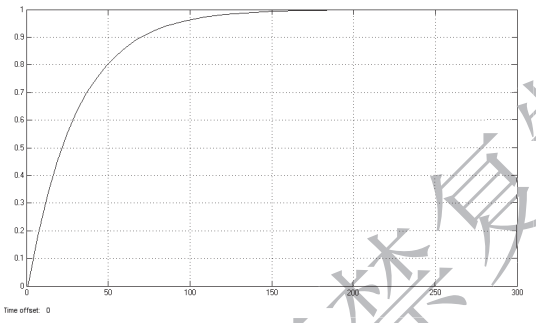
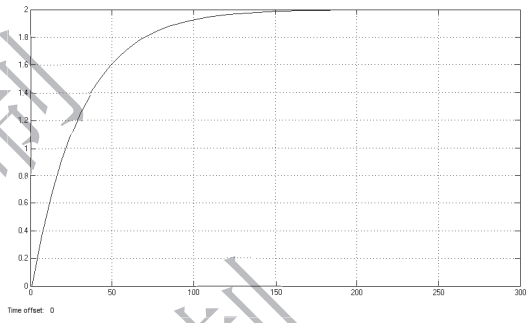
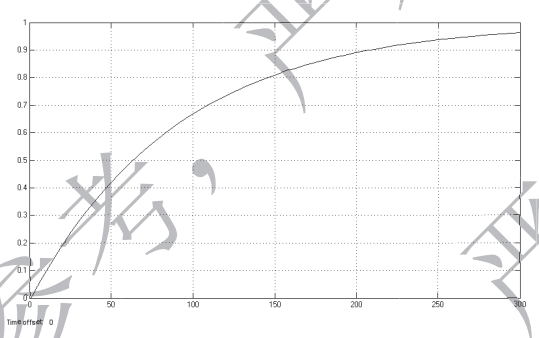
1、 过程（一阶、二阶环节）阶跃响应



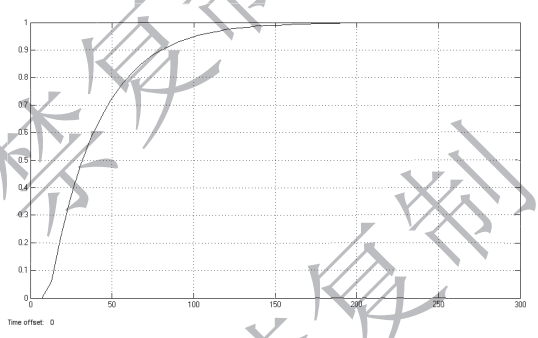
K=1, T_1=30, T_2=0, τ =0



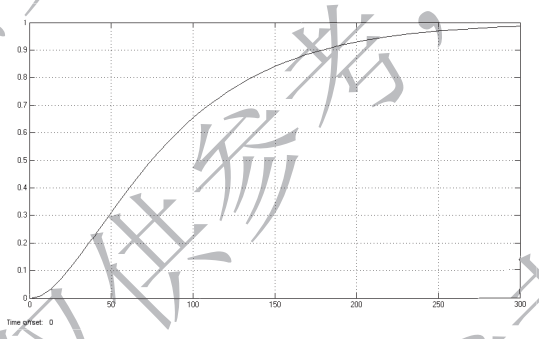
K=2, T_1=30, T_2=0, τ =0



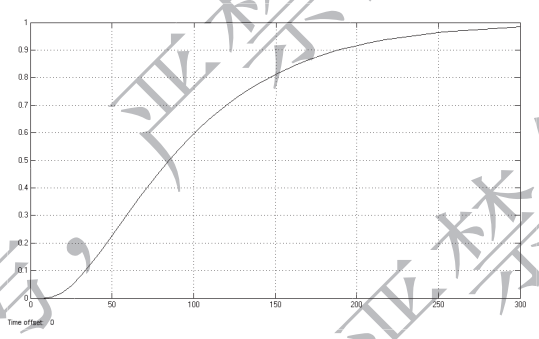
K=1, T_1=90, T_2=0, τ =0



K=1, T_1=30, T_2=0, τ =10



K=1, T_1=30, T_2=60, τ =0

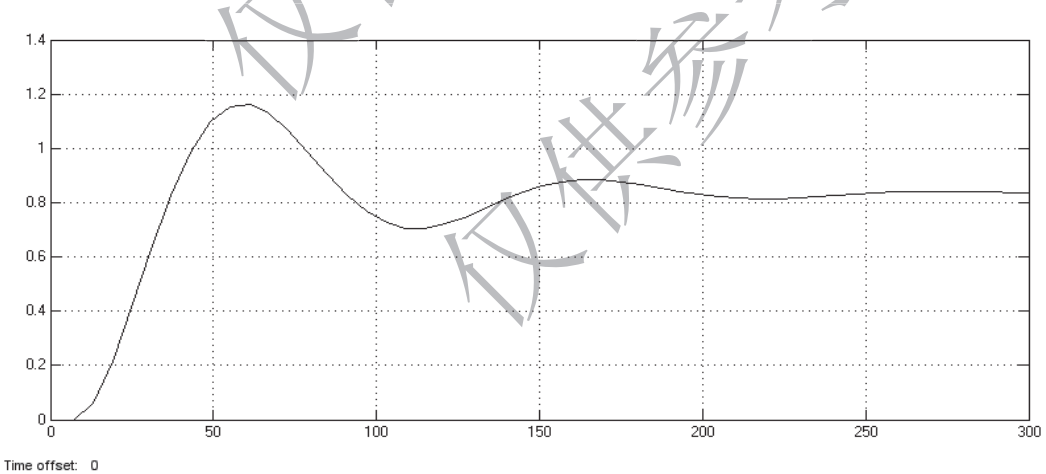


K=1, T_1=30, T_2=60, τ =10

2、 闭环控制系统的阶跃响应和品质指标

1） 随动控制系统的阶跃响应

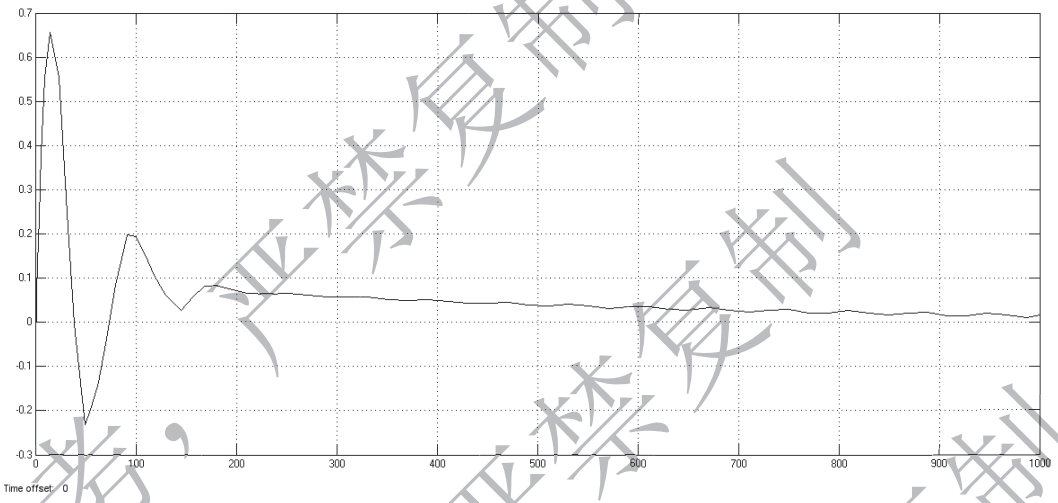
K=1, T_1=30, T_2=50, τ =5, K_C=5, T_1=1000, T_D=0



从图中可以看出，衰减比： 4.3，超调量：36.25%，余差：0.149，回复时间：188.5S，振荡周期： 102s

2） 定值控制系统的阶跃响应

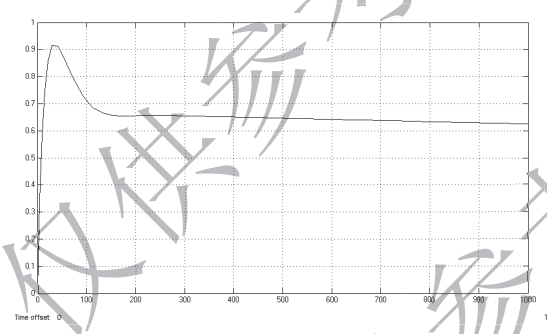
K_F=1, T_F=10, τ =0



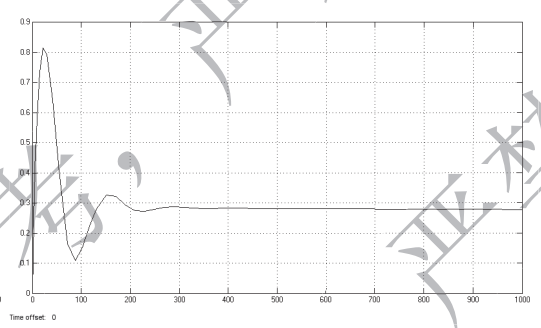
从图中可以看出，衰减比：3.313，最大偏差：65.6%，余差：0.0124，回复时间：361.264S，振荡周期：76.588S

3、 PID 控制规律及参数对过渡过程的影响

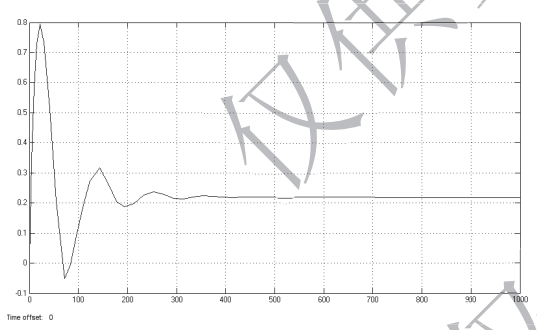
1） P 控制



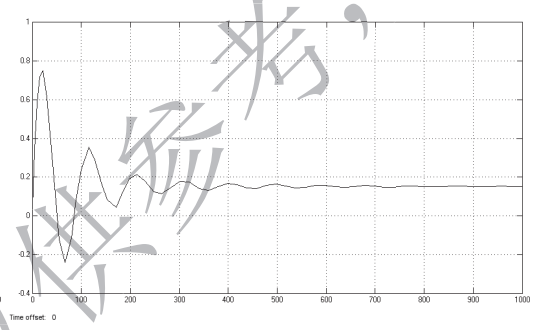
K_C=0.5



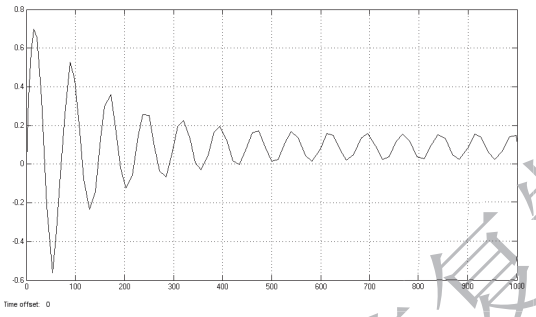
K_C=2.5



K_C=3.5

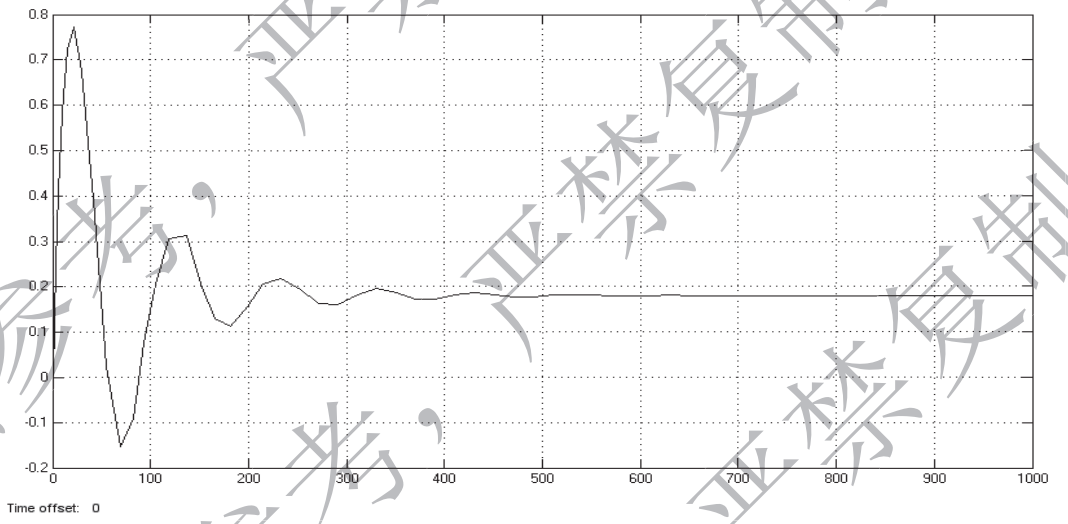


K_C=5.5



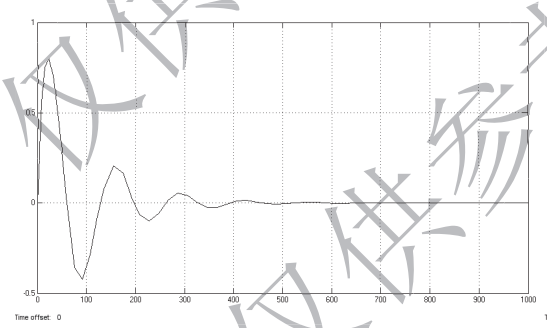
K_C=10

选取 K_C=4.5

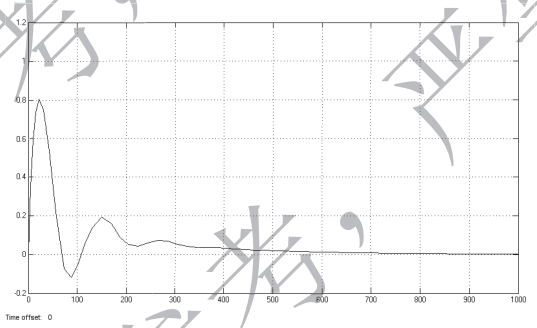


衰减比：4.313，最大振荡周期：115.962s，最大偏差：0.598，，余差：0.0006，回复时间：243.5S

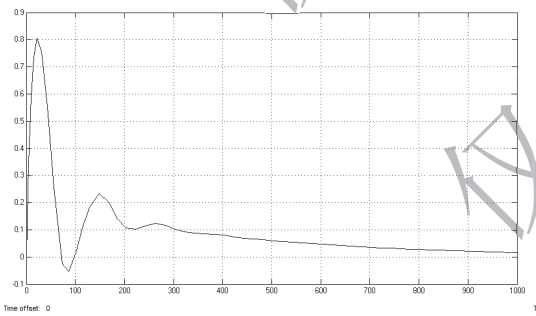
2）PI 控制



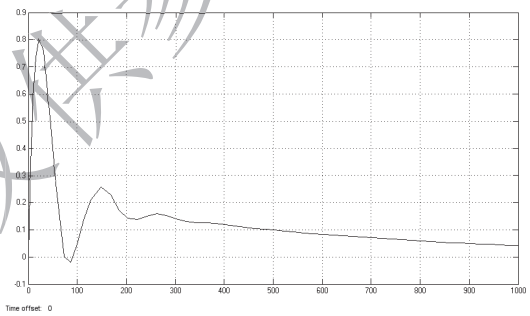
T_I=20



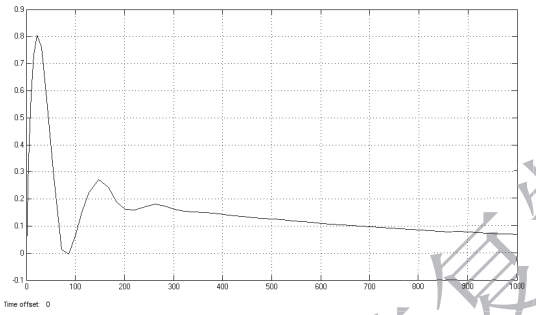
T_I=60



T_I=100

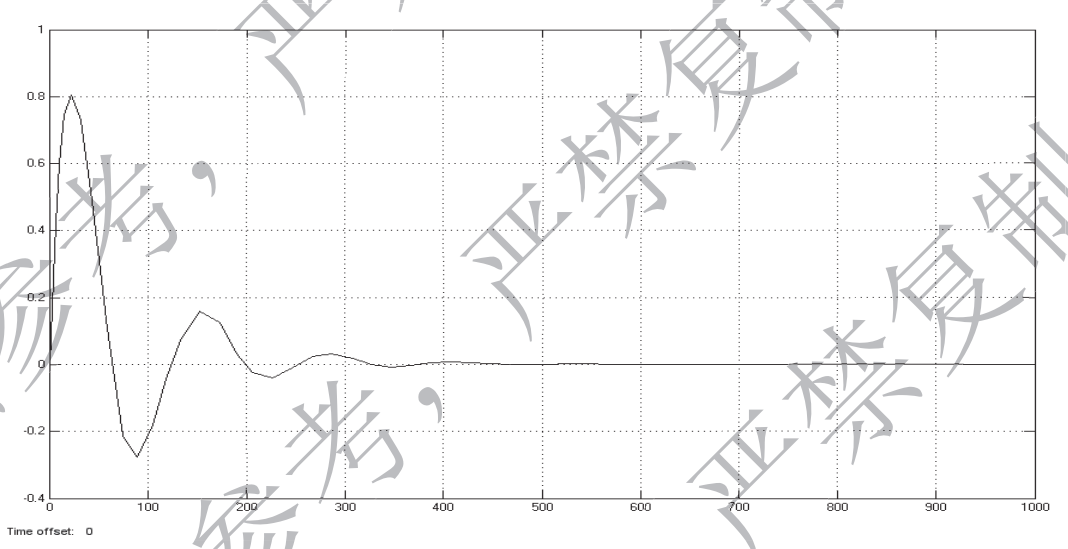


T_I=150



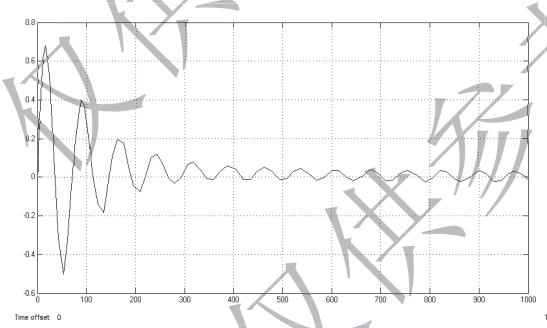
T_I=200

取 Kc=3，T_I=30

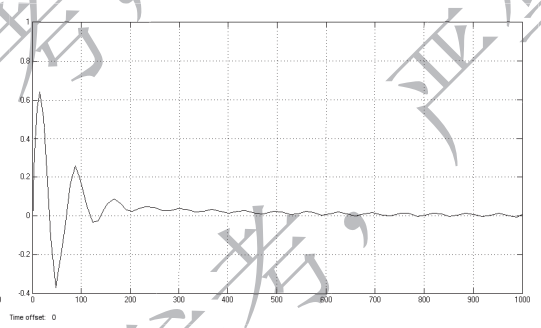


衰减比： 5.095，最大振荡周期：130.621S，最大偏差：0.805，余差：0 回复时间：186.6S

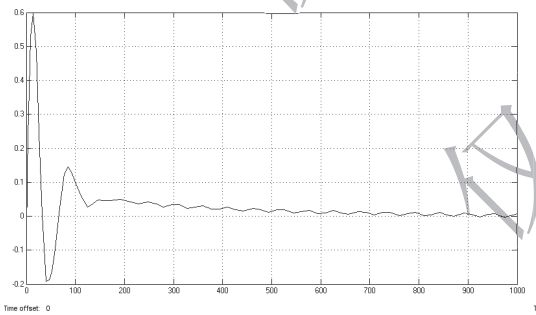
3）PID 控制



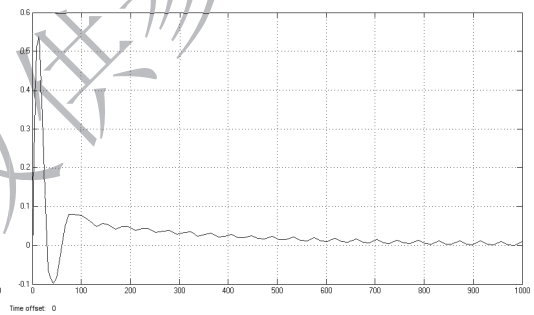
T_D=10



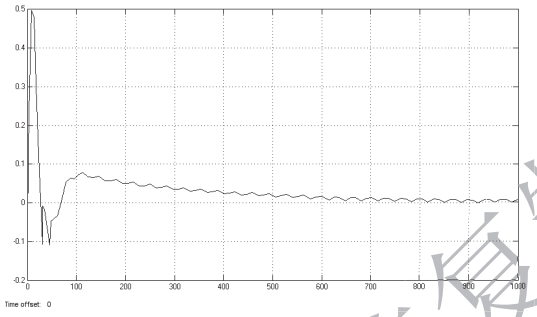
T_D=30



T_D=60

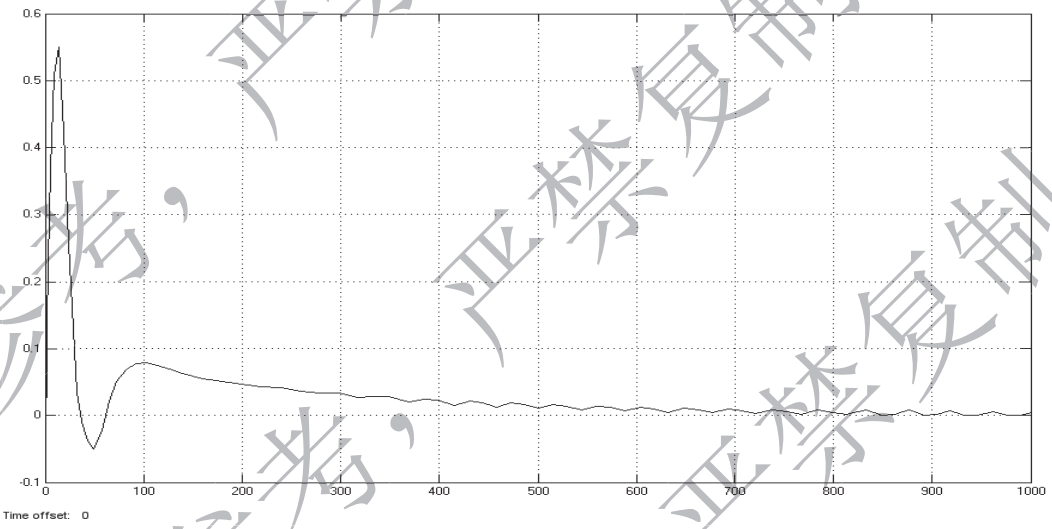


T_D=100



T_D=200

K_C=8, T_I=30, T_D=100



衰减比：7.024，最大振荡周期：88.762S，最大偏差：0.551，余差：0.006，回复时间：182.2S