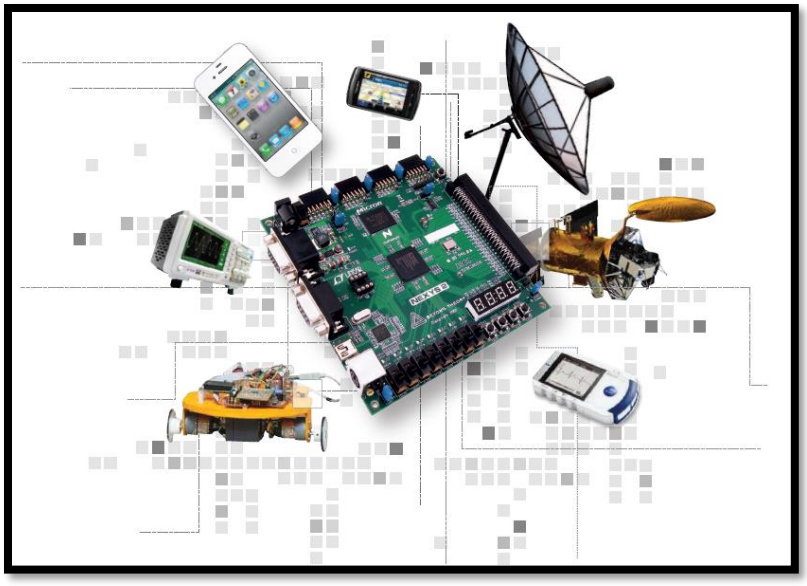
14-4-2024

Tarea 7

Sistemas embebidos



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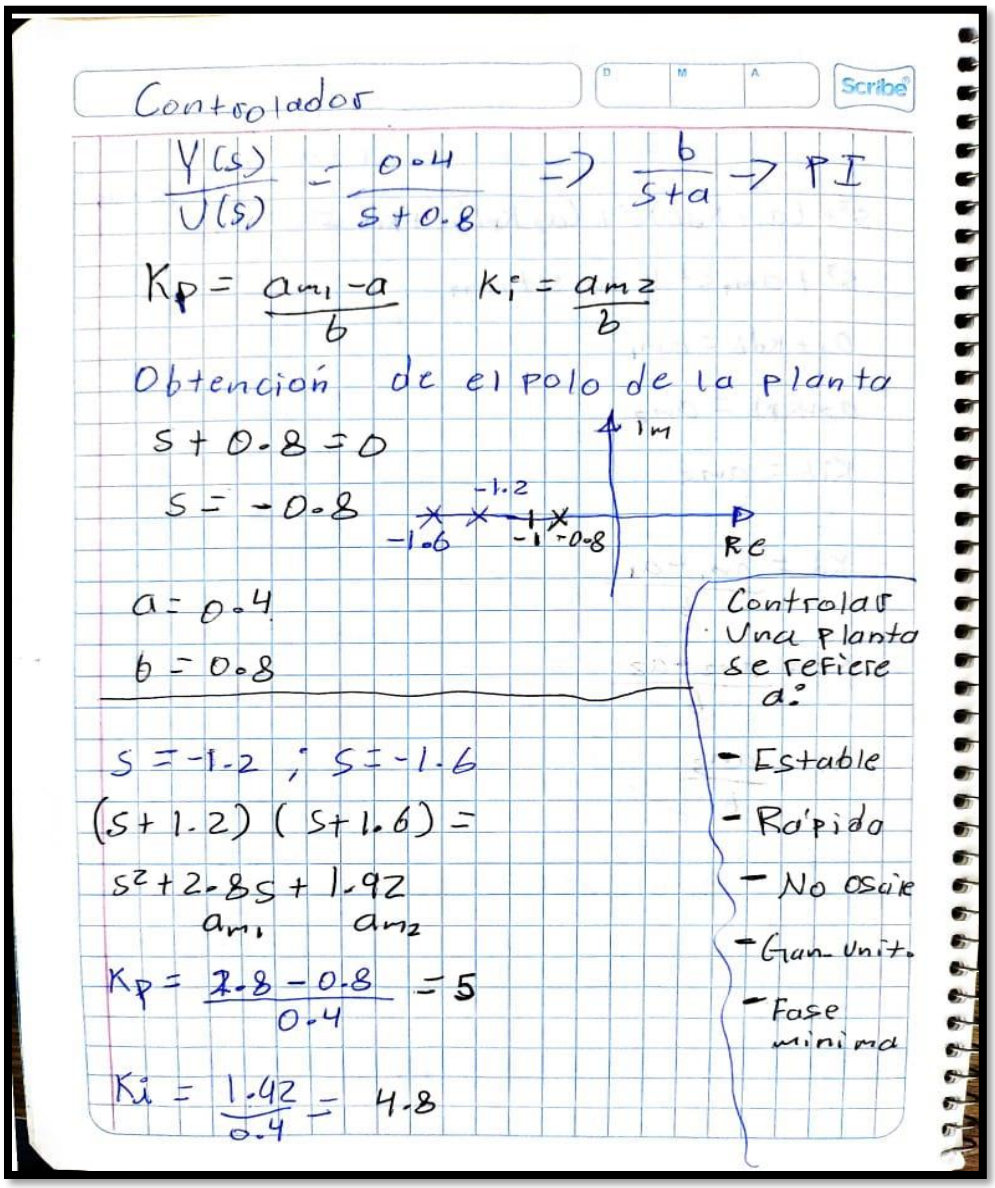
Controladores

Cargue a este buzón el ejercicio correspondiente al diseño de un controlador Proporcional-Integral para el sistema siguiente.

Y(s)/U(s)=0.4/(s+0.8)

En un archivo con formato de documento portable (pdf) debe reportar:

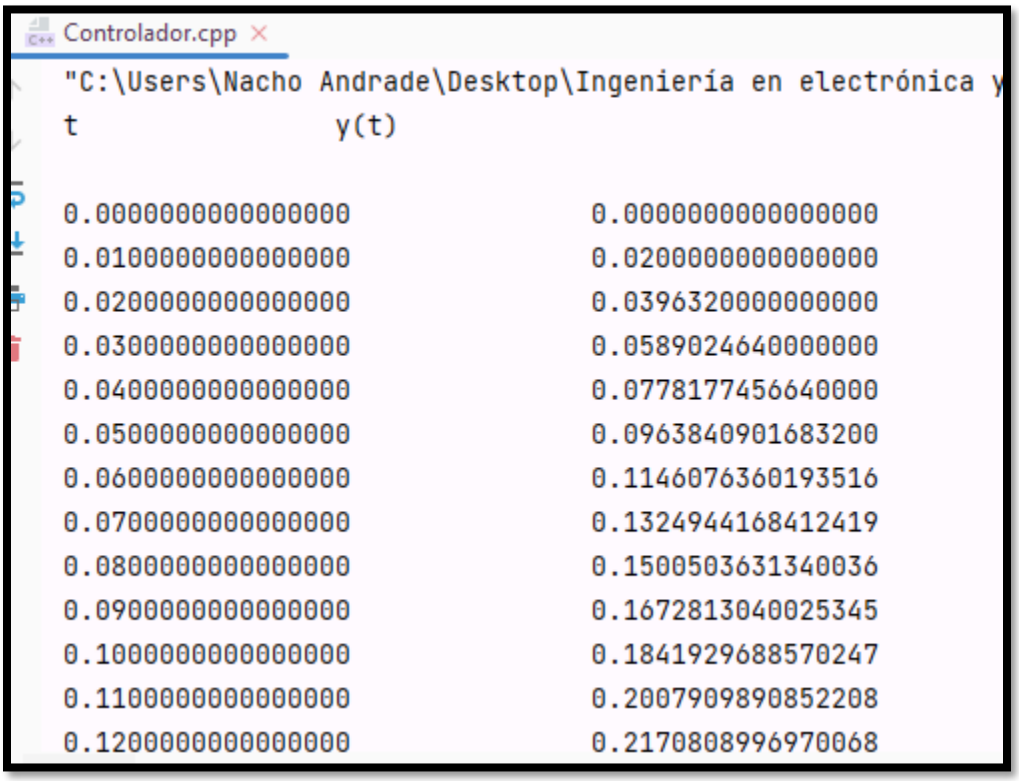
1. Diseño del controlador (Obtención de las ganancias kp y ki).
2. Código programado en C++.
3. Captura de pantalla del diagrama de bloques en Simulink.
4. Captura de pantalla con la comparación de resultados tanto de Matlab como de Simulink.



Código en C++

```c
// Online C compiler to run C program online
#include <stdio.h>
#include <math.h>

int main() {
    // Write C code here
    //Tiempo de simulación
    double tfin = 10;
    double h=0.01;
    int n = tfin/h;
    double y[n], u[n], t[n];
    //Parametros de planta
    double a = .8, b=.4;
    //Parametros de controlador
    double kp= 5, ki= 4.8;
    double ref = 1, e, I;

    printf("t \t\t y(t) \n\n");
    for (int i = 0; i<n; i++){
        //Vector de tiempo
        t[i] = i*h;

        //controlador
        e = ref-y[i];
        u[i]= kp*e+ki*I;
        I = I+h*e;

        //planta
        y[i+1] = y[i]+h*(-a*y[i]+b*u[i]);

        //Resultados
        printf("%0.16f \t\t %0.16f \n", t[i], y[i]);

    }
    return 0;
}
```

Salida en C++


Controlador.cpp
"C:\Users\Nacho Andrade\Desktop\Ingeniería en electrónica y
t y(t)
0.0000000000000000 0.0000000000000000
0.0100000000000000 0.0200000000000000
0.0200000000000000 0.0396320000000000
0.0300000000000000 0.0589024640000000
0.0400000000000000 0.0778177456640000
0.0500000000000000 0.0963840901683200
0.0600000000000000 0.1146076360193516
0.0700000000000000 0.1324944168412419
0.0800000000000000 0.1500503631340036
0.0900000000000000 0.1672813040025345
0.1000000000000000 0.1841929688570247
0.1100000000000000 0.2007909890852208
0.1200000000000000 0.2170808996970068

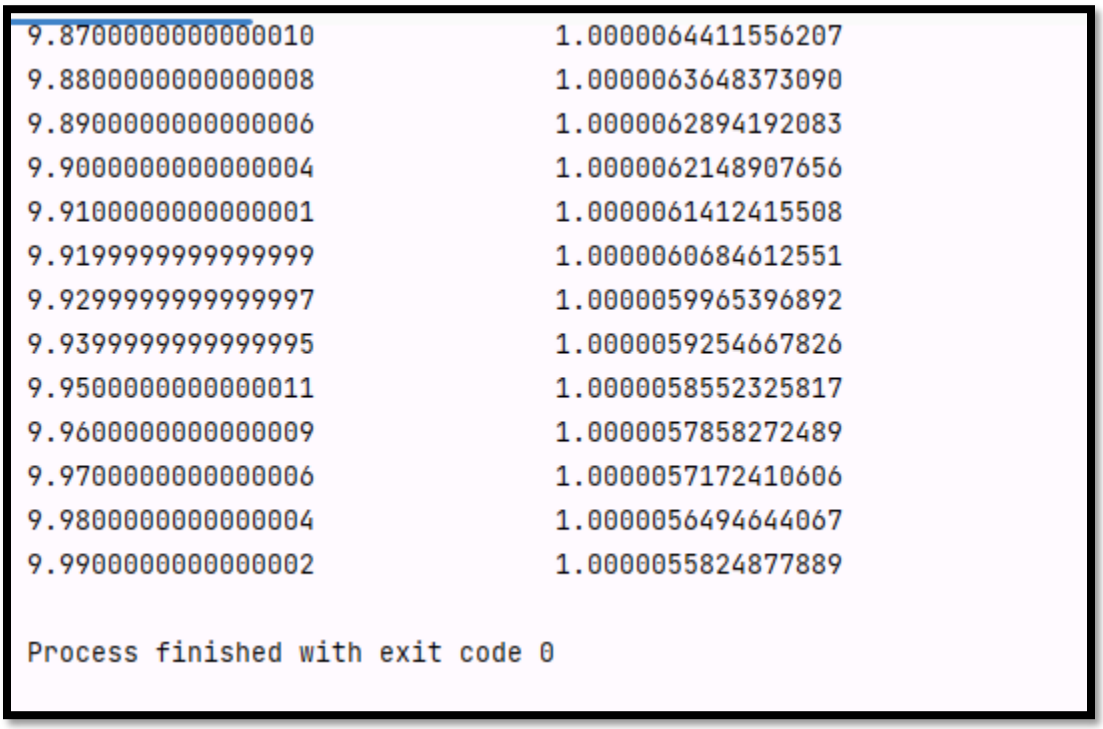
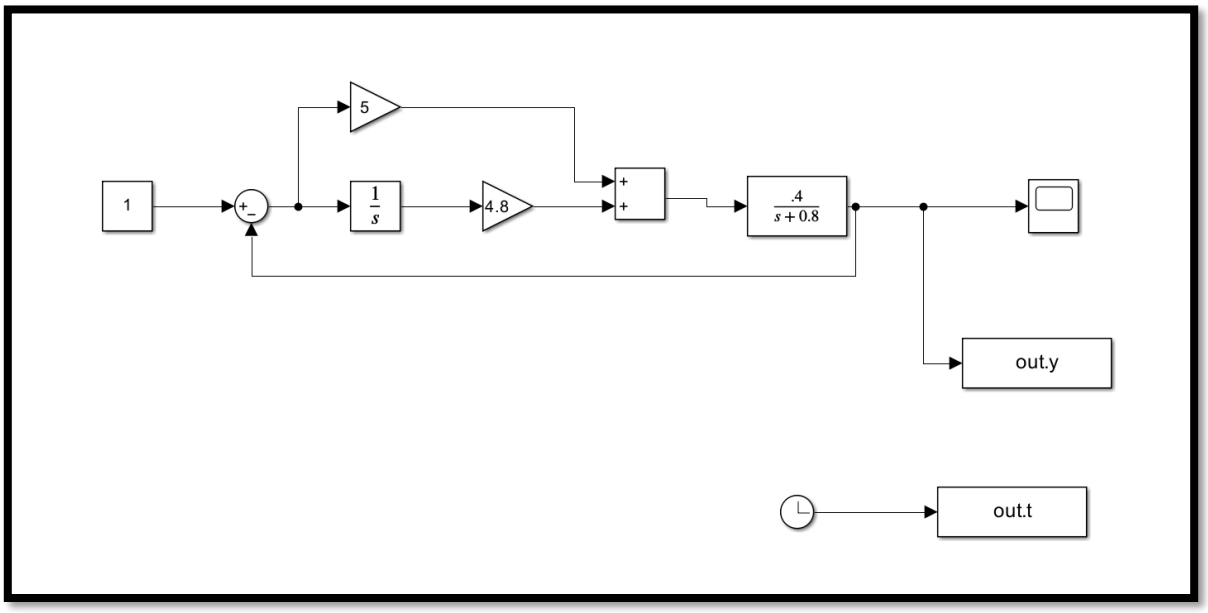
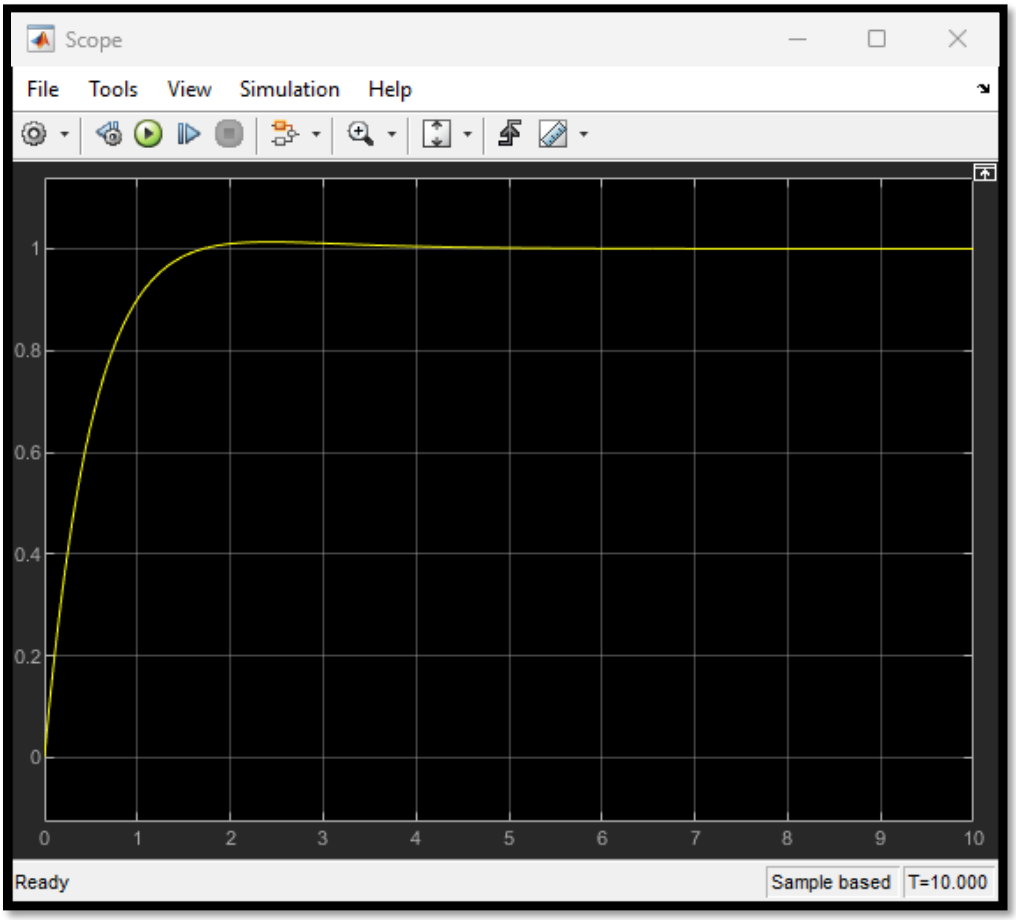

9.8700000000000010 1.0000064411556207
9.8800000000000008 1.0000063648373090
9.8900000000000006 1.0000062894192083
9.9000000000000004 1.0000062148907656
9.9100000000000001 1.0000061412415508
9.9199999999999999 1.0000060684612551
9.9299999999999997 1.0000059965396892
9.9399999999999995 1.0000059254667826
9.9500000000000011 1.0000058552325817
9.9600000000000009 1.0000057858272489
9.9700000000000006 1.0000057172410606
9.9800000000000004 1.0000056494644067
9.9900000000000002 1.0000055824877889
Process finished with exit code 0

Diagrama de simulink



Grafica saliente



Salida en Matlab