



TECNOLÓGICO NACIONAL DE MÉXICO



Práctica cero: Sistema Respiratorio

Departamento de Ingeniería Eléctrica y Electrónica, Ingeniería Biomédica

**Tecnológico Nacional de México [TecNM - Tijuana], Blvd.
Alberto Limón Padilla s/n, C.P. 22454, Tijuana, B.C., México**

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Información general



Nombre del alumno: Alan Omar Garcia Toledo

Número de control: 20210787

Correo institucional: **alan.garcia201@tectijuana.edu.mx**

Asignatura: **Modelado de Sistemas Fisiológicos**

Docente: **Dr. Paul Antonio Valle Trujillo;**

paul.valle@tectijuana.edu.mx

Datos de la simulación

```
clc; clear; close all; warning('off','all')
tend= '10';
file= 'Resp.slx';
open_system(file);
parameters.StopTime= tend;
parameters.Solver = 'ode15s';
parameters.MaxStep = '1E-3';
parameters.StopTime = '30';
```

Rendimiento del controlador

kP =1511.4945

kI =74979.6737

KD =7.0888

N = 161151.0351

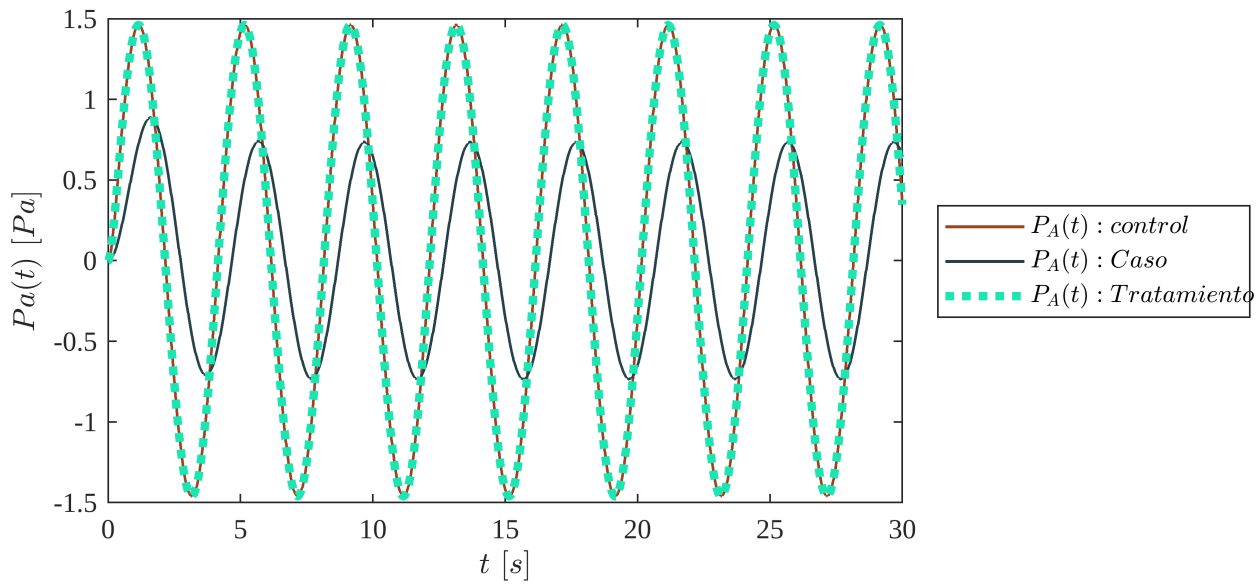
Settling time =0.0216

Overshoot =2.61%

Peak =1.03

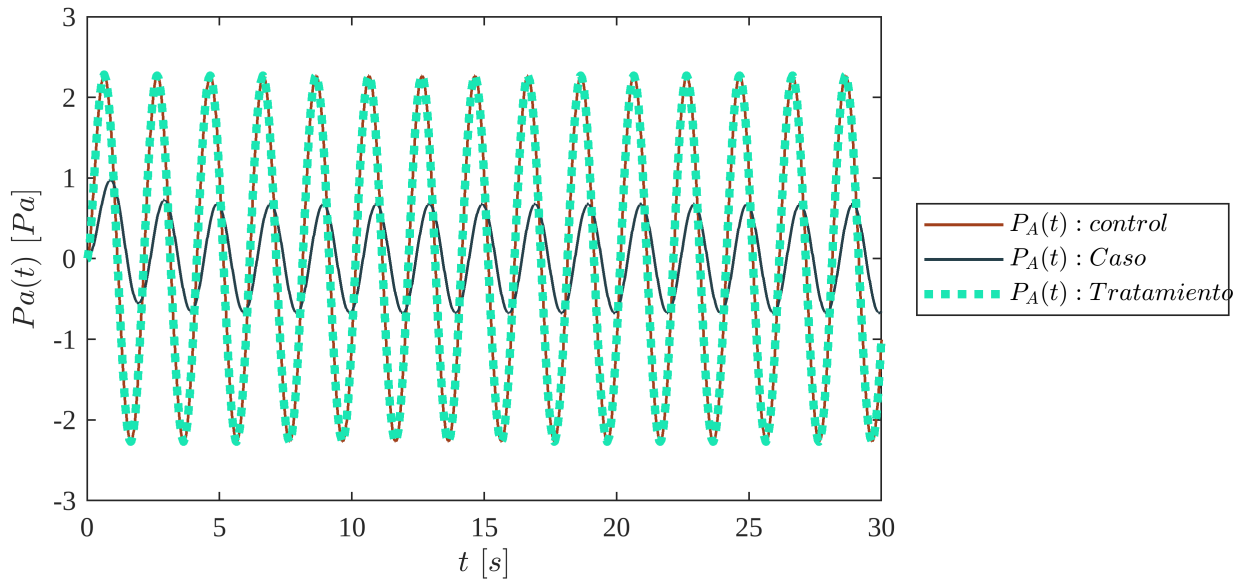
Respiracion Normal

```
Signal = 'Respiracion normal';
set_param('Resp/Pao(t)','sw','0');
set_param('Resp/PID Controller','P','1511.4945');
set_param('Resp/PID Controller','I','74979.6737');
set_param('Resp/PID Controller','D','7.0888');
N = sim(file,parameters);
plotsignals(N.t,N.PAx,N.PAy,N.PAz,Signal)
```



Respiracion Anormal

```
Signal = 'Respiracion anormal';
set_param('Resp/Pao(t)', 'sw', '1');
set_param('Resp/PID Controller', 'P', '1511.4945');
set_param('Resp/PID Controller', 'I', '74979.6737');
set_param('Resp/PID Controller', 'D', '7.0888');
N = sim(file, parameters);
plotsignals(N.t, N.PAx, N.PAy, N.PAz, Signal)
```



Funcion : Respuesta a las señales

```

function plotsignals (t,PA,Pao,PID,Signal)
    set(figure(),'Color','w')
    set(gcf,'units','Centimeters','Position',[1,1,18,8])
    set(gca,'FontName','Times New Roman')
    fontsize(10,'points')
    %Color 1 naranja [0.15,0.25,0.29]
    %Color 2 morado [0.5,0.3,0.2]
    %Color 3 azul [0.63,0.25,0.11]
    %Color 4 rojo [0.1,0.9,0.7]
    nal = [0.15,0.25,0.29];
    morl = [0.5,0.3,0.2];
    azul = [0.63,0.25,0.11];
    rojl = [0.1,0.9,0.7];
    hold on ; grid off; box on

    plot(t,PA,'LineWidth',1,'Color',azul)
    plot(t,Pao,'LineWidth',1,'Color',nal)
    plot(t,PID,':','LineWidth',3,'Color',roj1)

    xlabel('$t$ $[s]$', 'Interpreter','Latex')
    ylabel('$Pa(t)$ $[Pa]$', 'Interpreter','Latex')

    L = legend('$P_{A}(t)$: control$', '$P_A(t)$: Caso$', '$P_{A}(t)$:
    Tratamiento$');
    set(L,'Interpreter','Latex','Location','EastOutside','Box','on')

end

```