The response of the feedback control system[1-5]

References:

1. Coughanowr D., LeBlanc S., 2009, Process Systems Analysis and Control, McGraw-Hill ISBN: 978-007 339 7894

2. Bequette B.W., 2008, Process Control Modelling; Design and Simulation, Prentice-Hall, ISBN: 013-353640-8

3. Seborg D.E., Mellichamp D. A., Edgar T.F, Doyle F.J., 2011, Process Dynamics and Control , John Wiley and Sons ISBN: 978-0-470-64610-6

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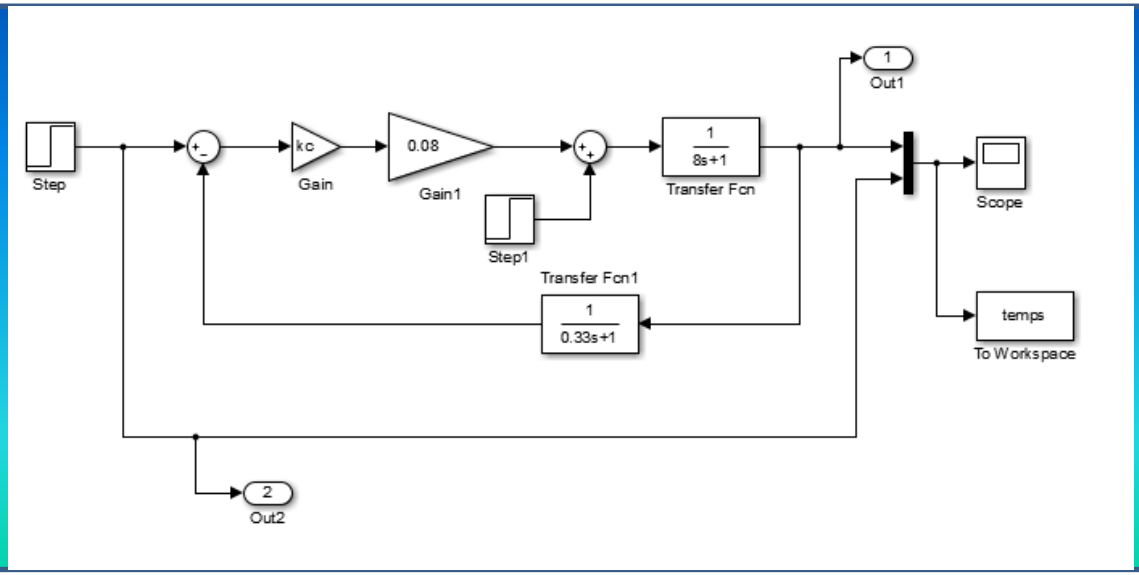


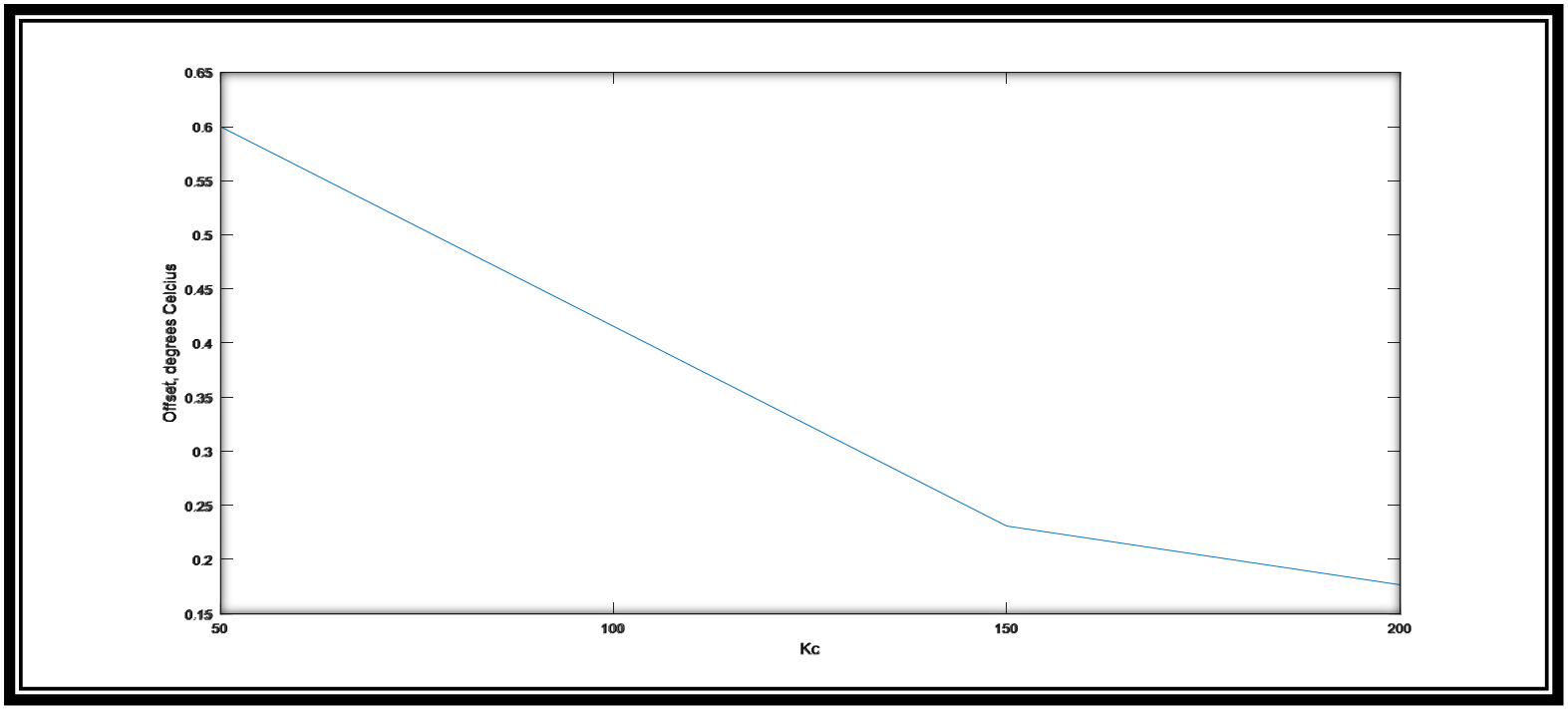
The control system for stirred-tank heater in Simulink

The script file for execution of Simulink model for different Kc values is given below:

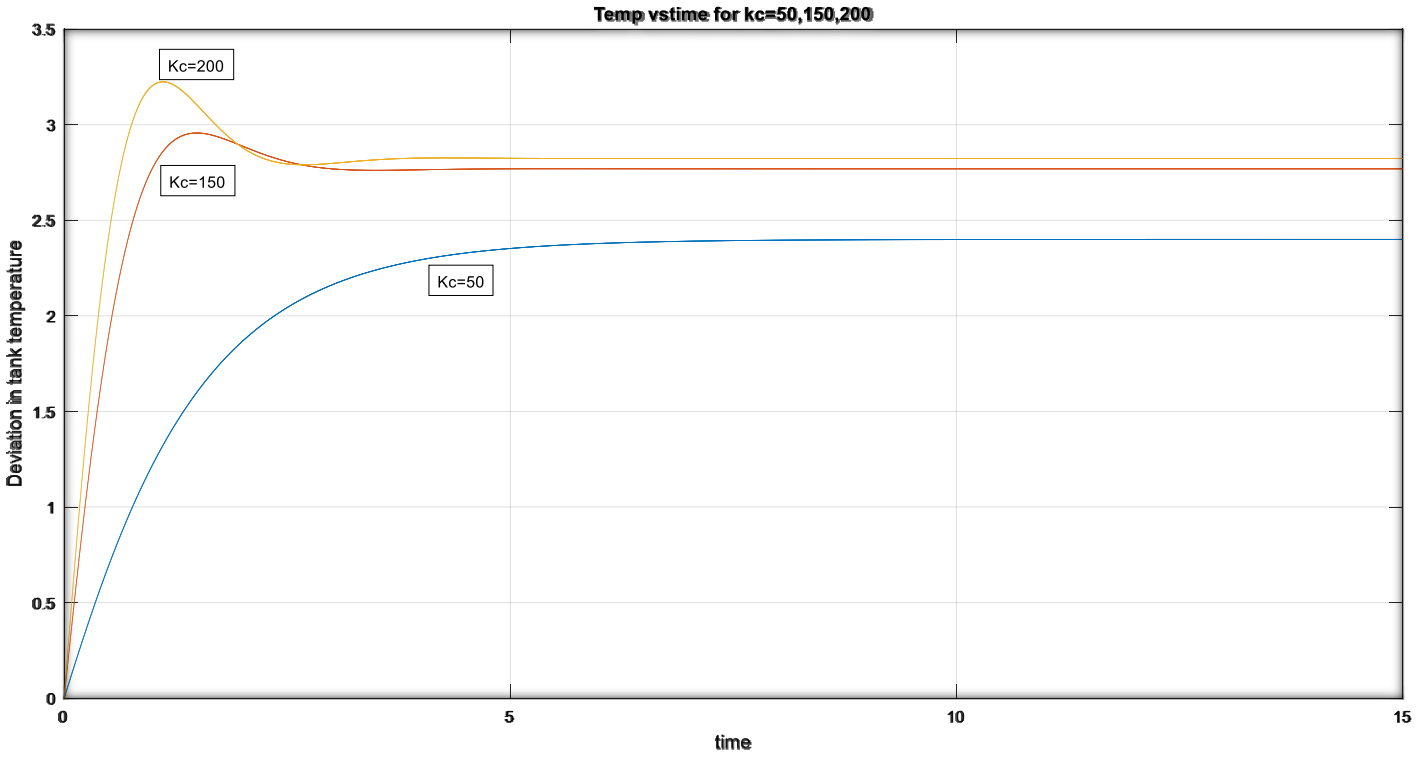
```
clear all
clc
kcplot(3,1)=0.0;
offset(3,1)=0.0;
for i=1:3
    z=[50,150,200];
    kc=z(1,i);
    [t,x,y]=sim('example12_1',15);
    plot(t,y(:,1))
    hold on
    [norow,nocol]=size(y);
    offset(i,1)=y(norow,2)-y(norow,1);
    kcplot(i,1)=kc;
end
grid
title('Temp vstime for kc=50,150,200');
hold off
figure;
plot(kcplot,offset);
title('Offset vs kc');
```

The output variable to be controlled: **controlled variable**
The input variable that controls the output : **manipulated variable**

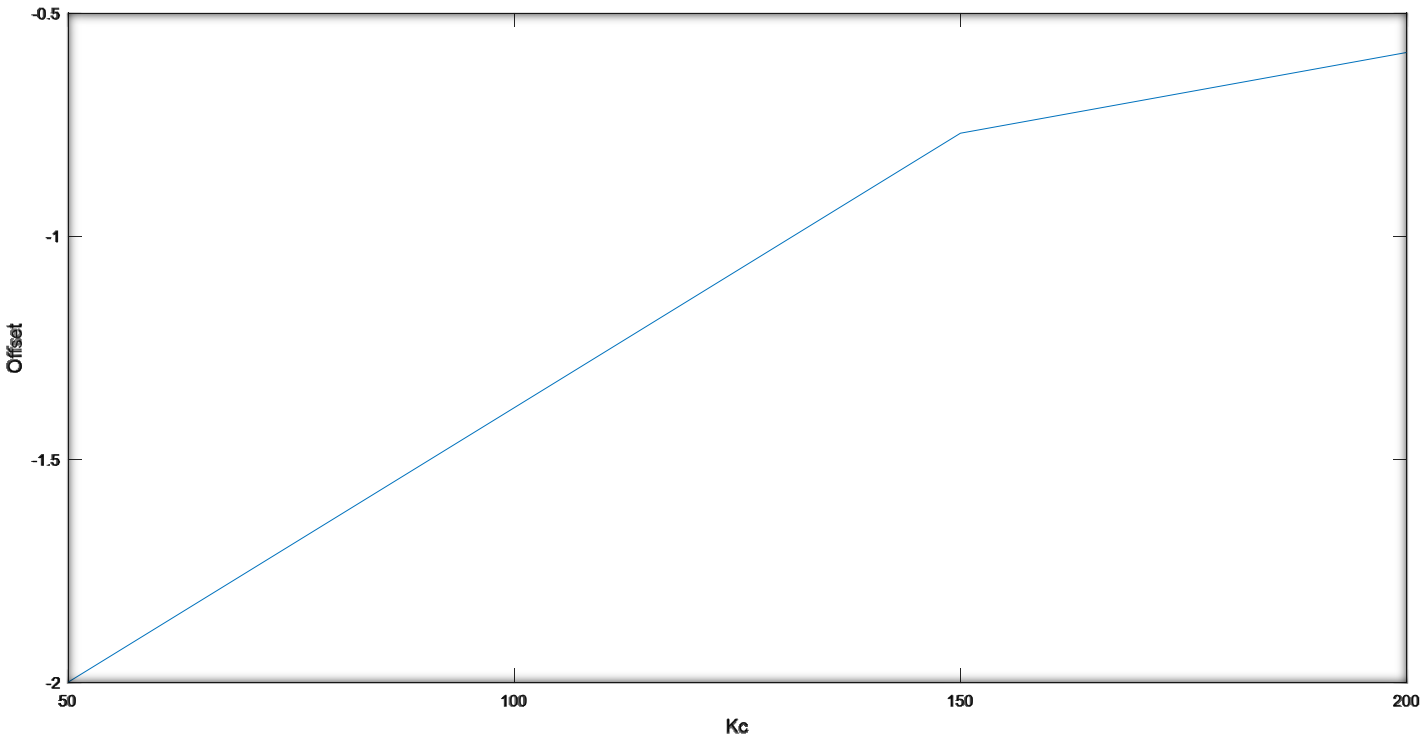
The example given in this part is feedback control . For the servo problem, the following figures are obtained using the Simulink model and the script file:



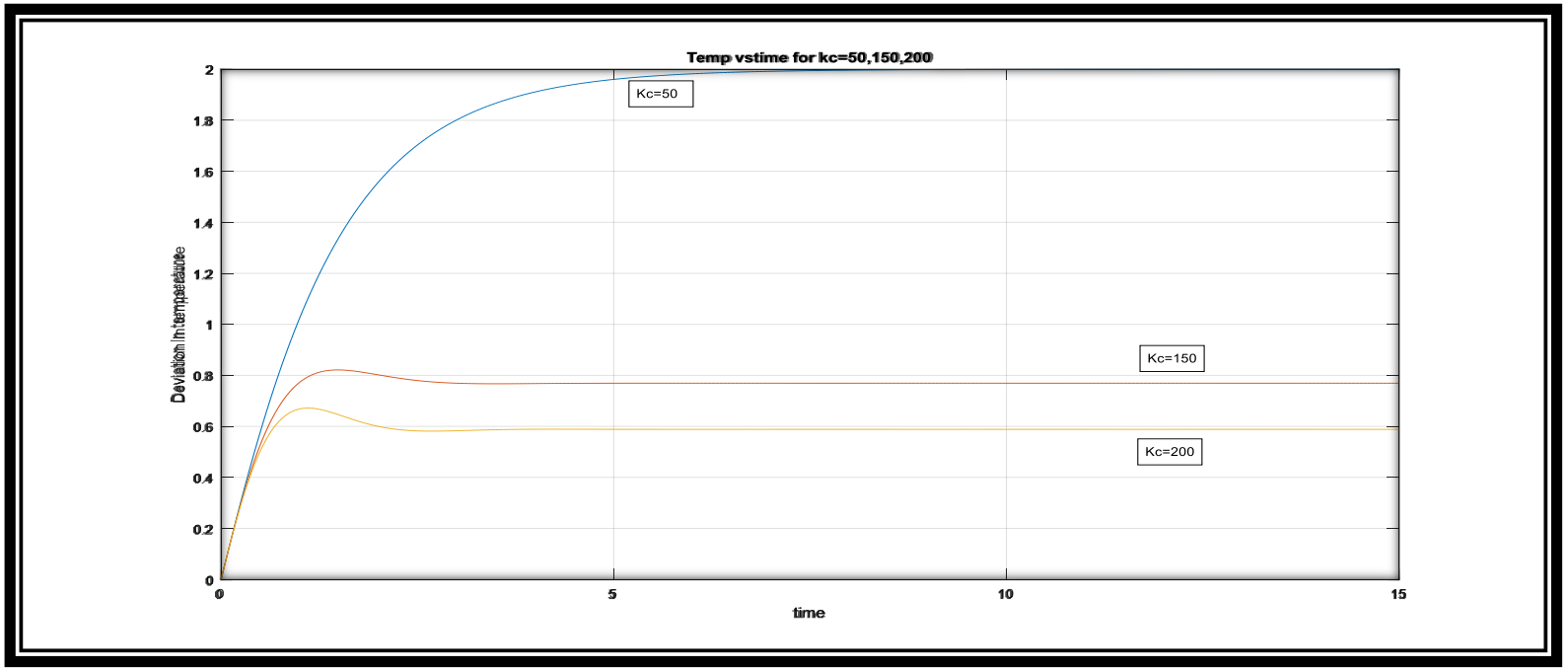
The response of a closed-loop proportional control system by using a Simulink model and a MATLAB m-file



For the regulatory problem, the following figures are obtained using the Simulink model and the script file:



the response of a closed-loop proportional control system for the step change in the inlet temperature



For the servo problem: As Kc ↑, deviation in tank temperature ↑, but the offset ↓

For the regulatory problem: As Kc ↑, deviation in tank temperature ↓, but the absolute value of the offset ↓