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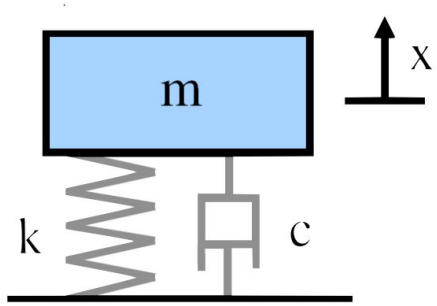
SYSTEMS LABORATORY - Spring 2017

Mass Spring Damper System



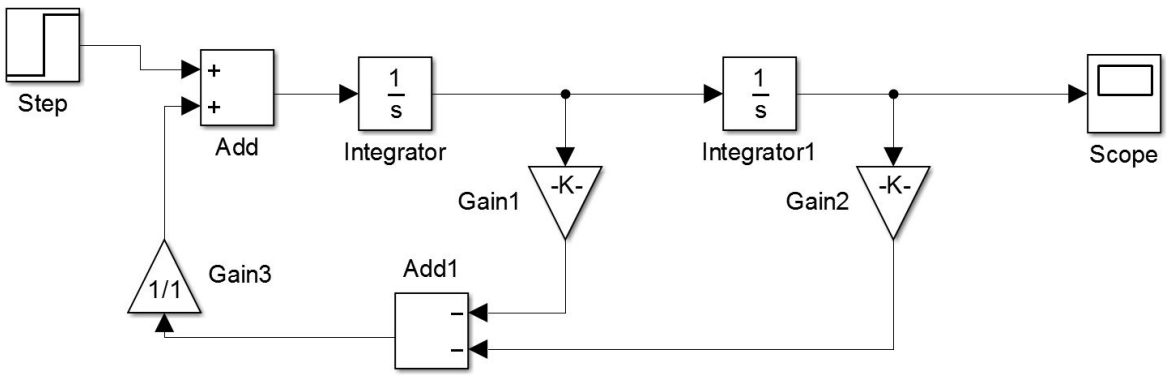
From newton's second law of motion,
$\mathbf{mx\ddot{} = -cx\dot{} - kx}$

The parameters were given as follows:

- Mass, **m** = 1kg
- Spring Constant, **k** = 500N/m
- Damping Coefficient, **c** = {10,44.7,100} N-s/m

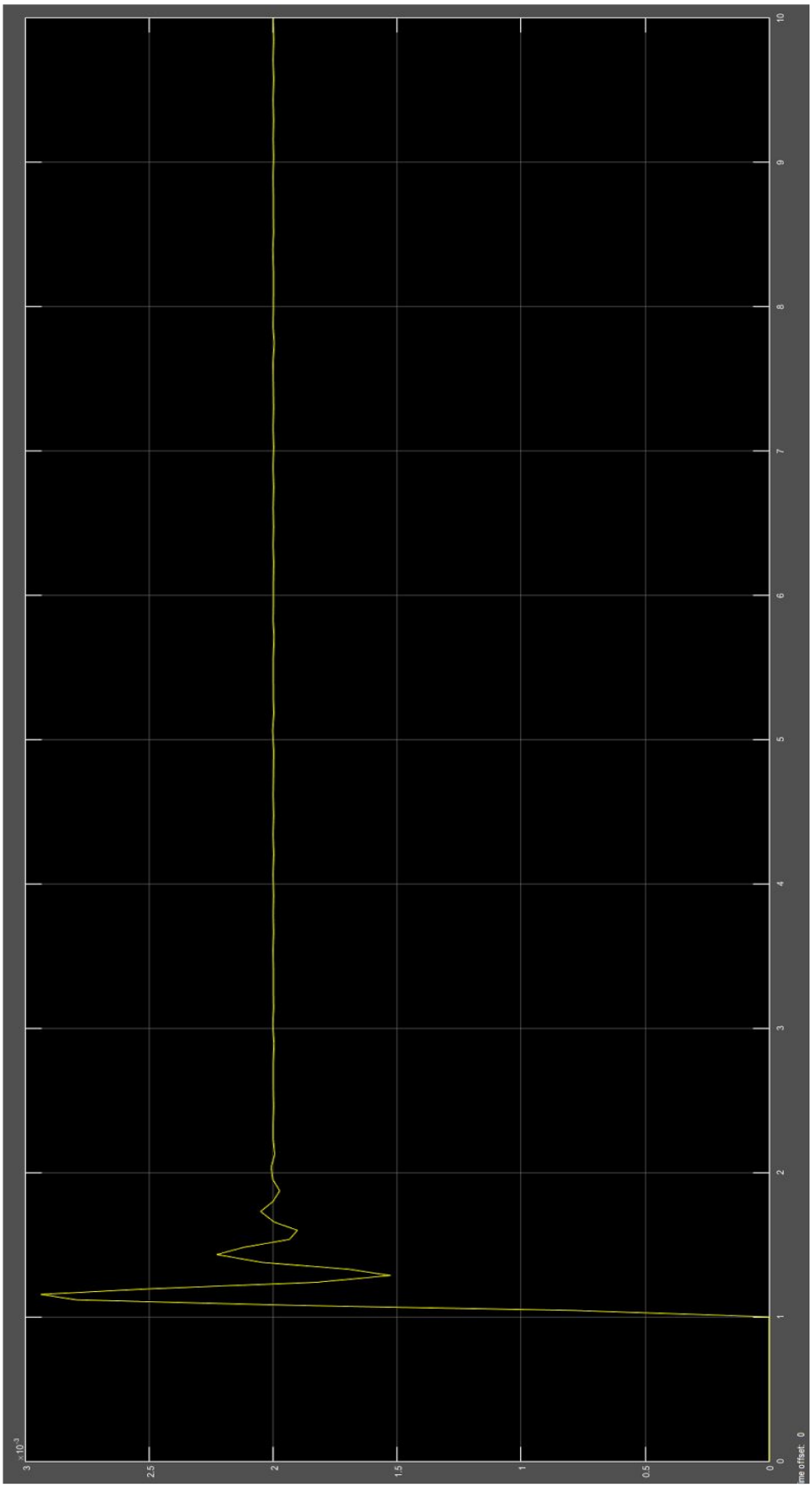
Solving the general second order universal oscillator differential equation, we get c=44.7 for the critically damped oscillator. Thus we expect to see the same.

Using simulink, this equation of motion was modelled as shown below.

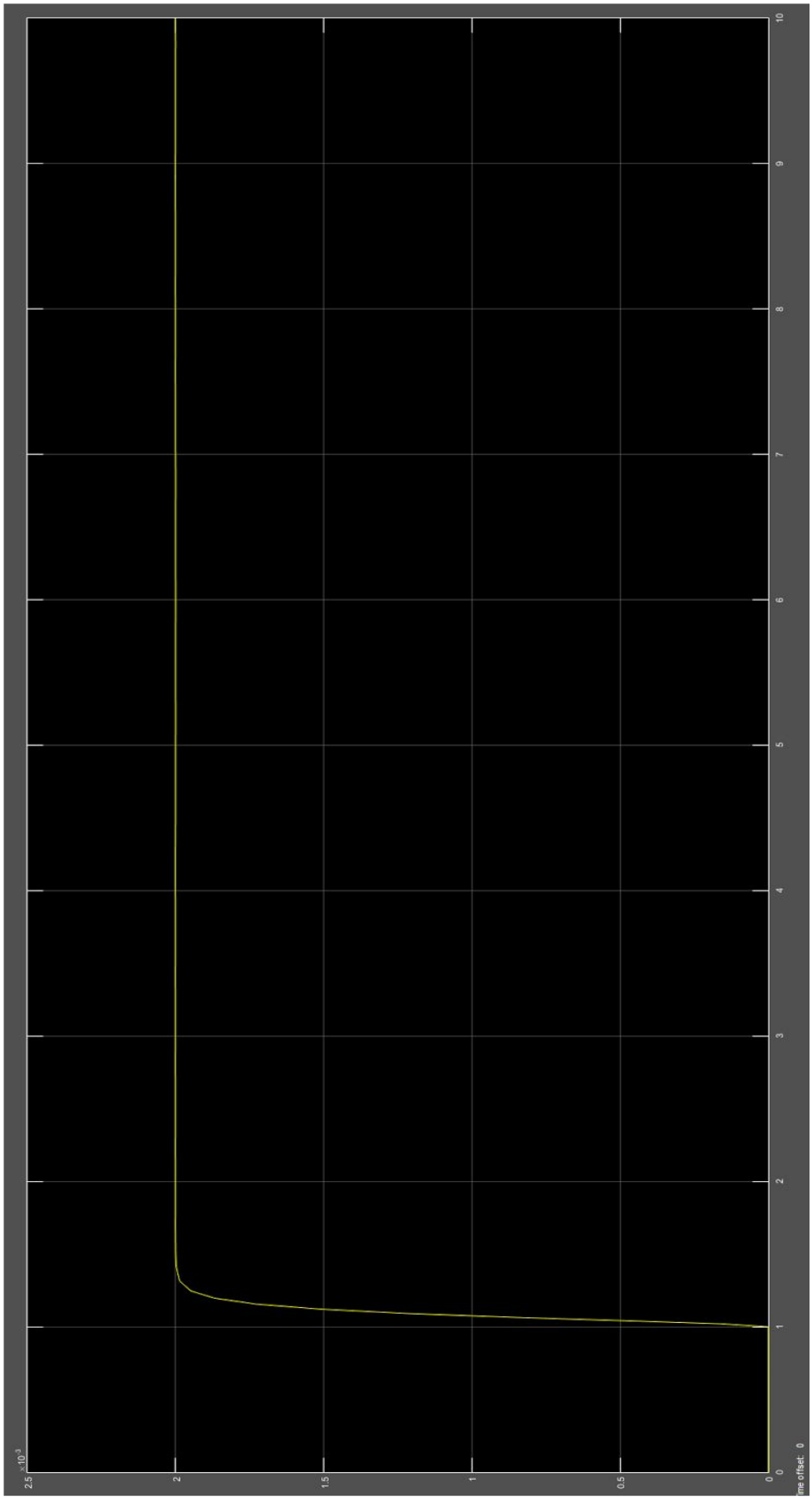


The following responses were obtained for a step input.

c = 10 N-s/m. This represents the case of **underdamping**. Damped oscillation is observed.



c = 44.7 N-s/m. This represents the **critically damped** case. No oscillation can be observed.



c = 100 N-s/m. This represents the **overdamped** case. No oscillation can be observed.