ZEUSNUMERIX

User Manual for Response of Shock Mount

C code to find the response of shock mount for the given input acceleration signal.

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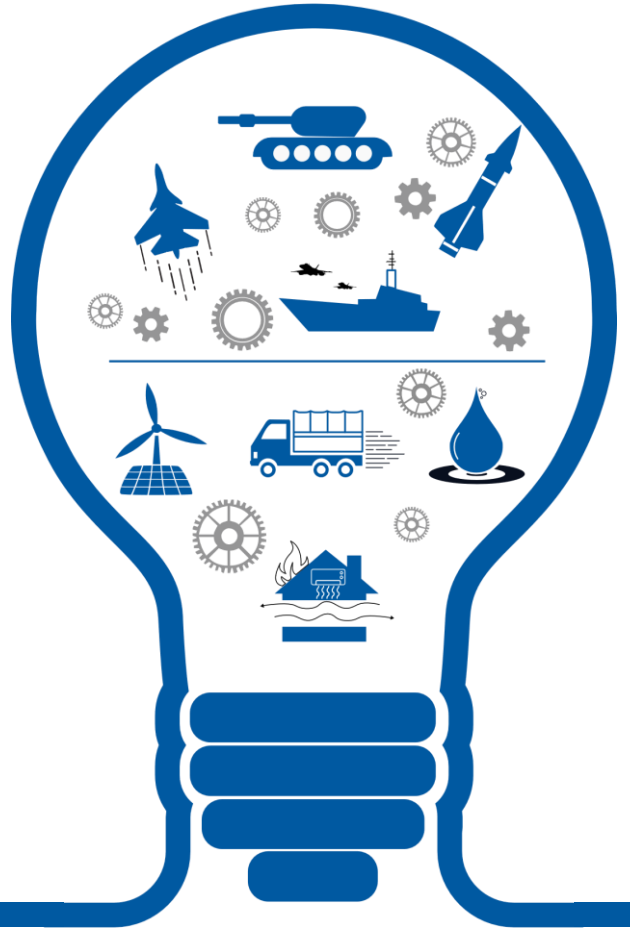
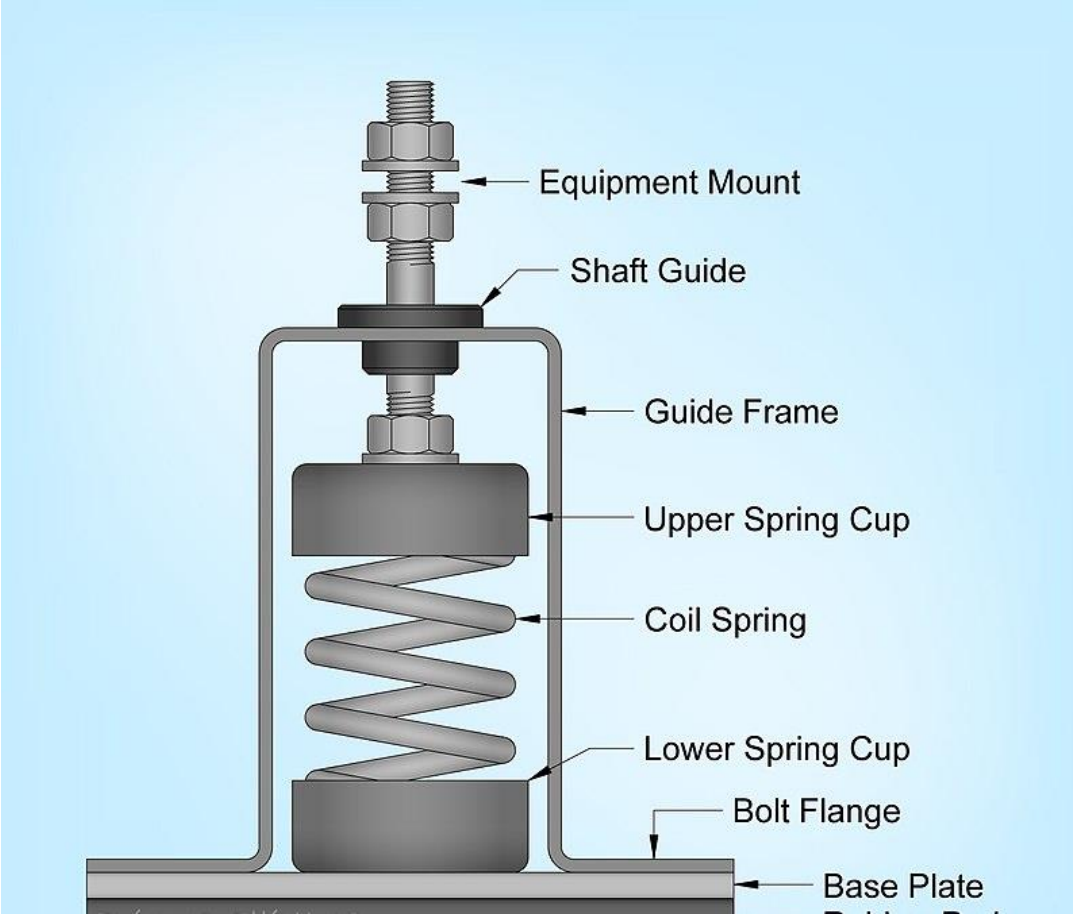


Shock Mount - Theory

- A shock mount or isolation mount is a mechanical fastener that connects two parts elastically. They are used for shock and vibration isolation.
- Shock mounts allow a piece of equipment to be securely mounted to a foundation and/or frame and, at the same time, allow it to float independently from the substrate.
- Shock mount is usually modelled as spring-mass-damping system.



Brief Explanation of Code

- Equipment mounted on shock mount is represented, in the application, by the name *equipment* and foundation/frame is indicated as *container*.
- Excitation acceleration is applied on the container which is taken as an input. Input can be any of the below three types:
  - Saw Profile
  - Sine Profile
  - Vertical Drop
  - Horizontal Impact
- Displacement/Velocity/acceleration of equipment is the output.

Input_data.txt

- The Input_data.txt is a text file that contains all the input data. It contains the following inputs:
  - *input* = saw/sine/drop
    - It defines the input type as given in previous slide
  - *equipment_mass*
    - The cradle mass is provided in (kg). This is used to calculate acceleration of cradle
  - *mount_no*
    - This key takes no. of mounts as an input
  - *mount_stiffness*
    - The mount stiffness is provided in (N/m). This is used to calculate force on the cradle
  - *response_time*
    - The response time is provided in (s). It define the time upto which response is calculated

Input_data.txt Contd…

- delta_t
  - Delta_t is provided in (s). It defines the time-step for the response.
- amplitude
  - Amplitude is provided in (m/s^2). It is amplitude of input/excitation acceleration. For sine profile it is the amplitude of the sine profile and for saw input it is the peak value. For drop input it is not required.
- time_period
  - Time period is provided in (s). For sine profile it is time period and for saw profile it the time upto peak value. For drop input it is not required.
- drop_height
  - Drop height is defined for drop input. It is height of drop. It is provided in (m).
- impact_velocity
  - Impact velocity is defined for horizontal impact input. It is provided in (m/s).
- gravity
  - Gravity is defined for drop input. It represents the acceleration due to gravity. It is provided in (m/s^2).

Sample Input_data.txt for saw profile.

- The left hand parameters are the *keys* and the right hand data are the *values* assigned to the corresponding keys
- Note: Its very crucial that there is a whitespace between the key, operator (=) and the value. The whitespace is the separator used to identify the input data

```
input = saw
equipment_mass = 91.6667
mount_no = 4
mount_stiffness = 72000
response_time = 0.120
delta_t = 0.00005
amplitude = 147.15
time_period = 0.02
```

Sample Input_data.txt for sine profile.

- The left hand parameters are the *keys* and the right hand data are the *values* assigned to the corresponding keys
- Note: Its very crucial that there is a a whitespace between the key, operator (=) and the value. The whitespace is the separator used to identify the input data

```
input = sine
equipment_mass = 68.75
mount_no = 4
mount_stiffness = 72000
response_time = 0.120
delta_t = 0.00005
amplitude = 41.202
time_period = 0.01
```

Sample Input_data.txt for vertical drop.

- The left hand parameters are the *keys* and the right hand data are the *values* assigned to the corresponding keys
- Note: Its very crucial that there is a whitespace between the key, operator (=) and the value. The whitespace is the separator used to identify the input data
- In this input we are dropping the equipment with shock mount on the container. So, it requires drop_height, impact_velocity and gravity as input data.

```
input = drop
equipment_mass = 91.6667
mount_no = 2
mount_stiffness = 46000
response_time = 0.240
delta_t = 0.0001
drop_height = 0.0735
gravity = 0.0
```

Sample Input_data.txt for horizontal impact.

- The left hand parameters are the *keys* and the right hand data are the *values* assigned to the corresponding keys
- Note: Its very crucial that there is a whitespace between the key, operator (=) and the value. The whitespace is the separator used to identify the input data

```
input = impact
equipment_mass = 91.6667
mount_no = 2
mount_stiffness = 46000
response_time = 0.240
delta_t = 0.0001
impact_velocity = 1.2006173
```

Output

- Output is the plot of the response. 1st plot shows the displacement, velocity of the cradle and equipment for the given input acceleration.
- Output plot is time response plot.
- Summary report of the response gives values of peak acceleration, half time period of cradle acceleration, maximum mount deflection.

Sample Summary_report.txt

- In summary report:
  - Peak acceleration denotes the maximum acceleration of the cradle/equipment in (m/s^2).
  - Time period of half sine denotes the half time period of cradle acceleration in (s).
  - Max deflection of mount denotes the maximum deflection of the shock mount in (mm).

```
    SUMMARY REPORT
Peak acceleration (m/s^2) = 1.254997
Time period of half sine (s) = 0.040775
Max deflection of mount (mm) = 0.653644
```

Thank You!

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