Impulse Response LabVIEW GUI Assignment

The following exercises can be used with the Impulse Response LabVIEW GUI to better understand its capabilities and the concepts which it illustrates.

1. Set the initial displacement and velocity to zero, and give the system an impulse input. Observe the time response. How could you determine that this was an impulse response, based solely on the time response?

2. Add an initial displacement, along with the impulse, and observe the response.

3. Compare the initial velocity response and the impulse response. Do they differ? Would you be able to tell them apart based only on the time response?

If you have not already done the Free Response LabVIEW GUI Assignment, complete the following exercises:

4. Set damping to 20. Adjust the mass and/or stiffness to get two real roots as indicated by the root locus plot. Which parameter had a greater effect? What is the critical damping, and how does this relate to the current damping of the system?

5. Repeat the above exercise and adjust the mass and/or stiffness to get two repeated roots as indicated by the root locus plot. How do you know that they are indeed two repeated roots?

6. Set the stiffness to 30. Adjust the mass and/or damping to achieve a natural frequency of 1 Hz. Were you able to do this? Adjust the stiffness until the natural frequency is 1 Hz.

7. Set the mass to 5 and the stiffness to 100. Look at the frequency response plot and observe the shape and location of the peak at the natural frequency. Now change the damping, observe the change in the natural frequency and damped natural frequency, and compare to the frequency response.

8. Adjust the parameters until the critical damping is approximately 30 lbf-s/in. How does each of the parameters affect the critical damping?