Five-Way FRF GUI Assignment

This assignment can be used with the Five-Way FRF MATLAB GUI to illustrate some of its major concepts.

Note: All plots in the GUI are shown with positive and negative frequencies. When working with complex numbers, each value has a complex conjugate which is represented by the negative frequencies on the plots.

1. Set the mass to 10, adjust the damping and/or stiffness so that the magnitude is approximately 0.5.

2. Set the damping to 3, adjust the mass and/or stiffness so that there are two distinct peaks with magnitudes of approximately 0.2.

3. Set the stiffness to 20, adjust the mass and/or damping so that the natural frequency is approximately 2 rad/sec and the magnitude is approximately 0.6.

4. Look at the phase plot in the lower right hand corner. The phase can be plotted in radians or degrees. This plot is plotted as radians vs. frequency in rad/sec. Now, set the mass to 5, the damping to 0.1, and the stiffness to 100. How much phase is lost as it passes over resonance? Is this phase loss affected by damping?

5. Compare the real and imaginary components at the resonant frequency. What is the real value when the imaginary value is maximum?

6. The plot in the bottom center is called a Nyquist plot. The horizontal axis is the real axis and the vertical axis is the imaginary. Adjust the settings to:
   mass = 5
   damping = 0.3
   stiffness = 100
   When the real part is zero, what is the imaginary value? Now look at the magnitude and imaginary plots… what are their respective values?