Single Degree of Freedom FRF Component GUI Documentation

M File Use

INTRODUCTION

The FRF Component GUI was designed to be used to assist in a student's understanding of a single degree of freedom's general dynamic response. This GUI allows the user to vary the mass, damping and stiffness of the system and view the resulting five components of the frequency response function.

Instruction on GUI usage will be shown in this document. For further explanation on the topic of single degree of freedom responses, see the Second Order System Tutorial.

FILES NEEDED TO USE STEP RESPONSE GUI

- five_way_frf.fig
- five_way_frf.m
- five_way_frf.p

RUNNING THE FRF COMPONENT GUI

With the proper working directory selected, type 'five_way_frf' in the MATLAB® command window

Figure 1 shows the appearance of the GUI after it is first opened, and Figure 2 illustrates the plot field layout. There are initial values selected for the mass, damping and stiffness. These values can be changed by inputting a value manually by selecting the respective value field, or by using the respective slider bars.

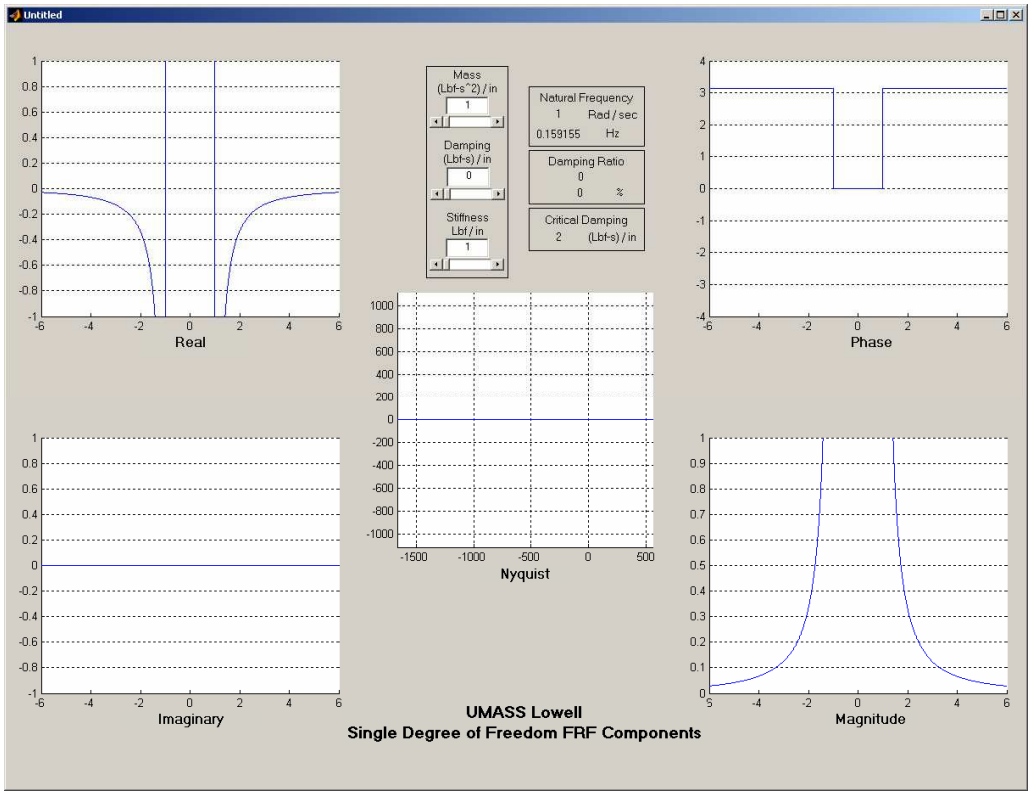


Figure 1: SDOF FRF Component GUI

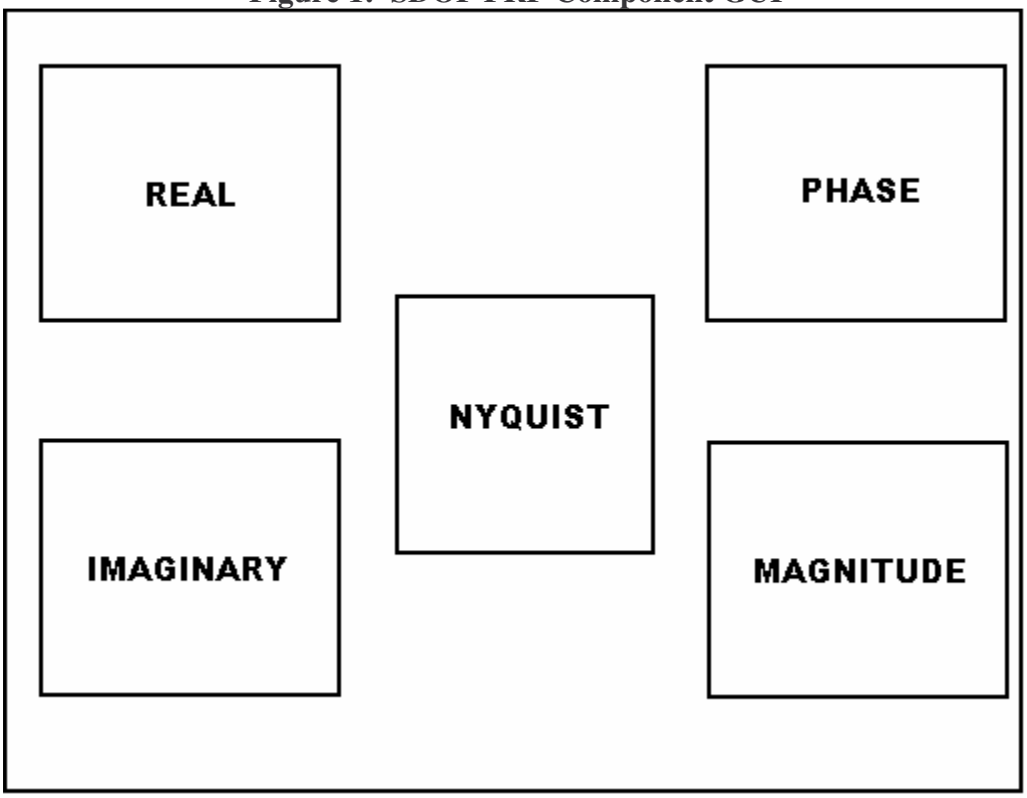
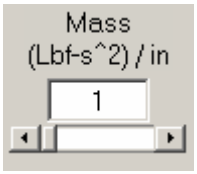


Figure 2: Plot Field Layout

Allowable input values

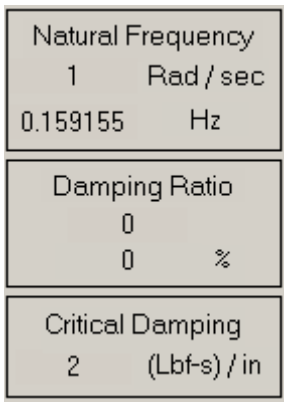


- Mass: 1 – 10

- Damping: 0 – 70

- Stiffness: 1 – 100

With the given mass, damping and stiffness, the natural frequency (radians/second and Hz), damping ratio (real and %), and critical damping ((lbf-s)/in) are calculated and presented in the fields above the Nyquist plot field. The calculated Linear Magnitude, Phase, Real, Imaginary, and Nyquist components of the frequency response function are plotted in their respective fields.



The value shown in the Critical Damping can be copied and used in the Damping field. This value will result in the display of a critically damped frequency responses and a repeating pole.