Instructions for the use of InfExpHorn.m

Below are a few steps to guide the user during the initial runs with the program.

1. First make a backup copy of the file and place it somewhere other than the directory from which you plan to run the examples and your other horn problems.

2. After opening Matlab make sure you see the file listed in the 'Current Folder' section of Matlab (typically far left panel).

3. Double click on the file to bring the file up in the editor. This is not necessary to run the file, but will allow you to read more of the comments and to see the location of the items discussed in this part of the Instructions.

4. The Matlab function InfExpHorn.m consists of 180 lines which you should see numbered in the editor.

5. You will note that line 1 is the function definition line that reads

   [infrealZa1, infimagZa1]=InfExpHorn(fc,ST);

   and is preceeded by the Matlab keyword 'function'. This alerts Matlab to the fact that this file is a Matlab m-file function. What is important to the inexperienced user is that the name of the file and the actual function name should be the same. So if you choose to modify the function call name, say to MyName(fc,ST,), you must also save this file under the name MyName.m.

6. The bracketed portion [infrealZa1,infimagZa1] represents the 'return' variables (see lines 31-32) that will be returned to the Matlab workspace area, and will be available for the user at the command line. So it is important to put the entire command starting from the left bracket until the right parenthesis followed by the semicolon at the command prompt and hit return to properly run the function (after first making sure you enter the correct values for fc and ST).

7. The variables infrealZa1 and infimagZa1 are n x 2 matrices, where the first columns of infrealZa1 and infimagZa1 contain the frequencies f used in the

calculation (see line 20), and the second contain the real or imag part of the input acoustic impedance of the horn model. They can be copied into a program like Excel and compared to other calculations, such as those produced by Hornresp (which allows export of csv files of its data). This is in fact how I sometime produce the plot comparisons of the Matlab program and Hornresp.

8. When you run InfExpHorn.m it produces a plot of the real and imaginary portions of the input horn impedance over the frequency range you specified. This is essentially a plot of infrealZa1 and infimagZa1 over the frequency range specified in line 20.

9. In addition to the inputs fc (horn cut-off frequency) and ST (horn throat area) required in calling the InfExpHorn.m function, you have the option of changing the default frequencies, frequency interval and horn segment intervals. This is called out in the program on line 20. The default parameters are a Low frequency of 10 Hz a High frequency of 5000 Hz, and a frequency interval of 1 Hz (viz., f=10:1:5000).

10. The program uses a secondary function, piecewise.m written by Tobin Driscoll (see lines 35-180). This was necessary as Matlab in the most current version that I have (R2012b) does not include a simple piecewise function routine in the functions it supplies with the code.

11. Lines 13-17 perform the necessary steps to get the horn input impedance Za1 into the correct format.

12. Lines 20-32 perform the task of plotting the data and preparing the return matrices, infrealZa1 and infimagZa1. Note: Lines 24-32 can be modified to change the output text and graphing limits. The program defaults to semilog plots, but could be changed to regular plots by changing 'semilogx' to 'plot' on lines 24 and 27.

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