

Hydrodynamic cochlear model

Basilar membrane velocity and Intracochlear pressure

Written by Yongjin yoon

1. File name and information

-. Main file lists

- a) eiconal_JASA.m: Define input parameters (gerbil)/Solve eiconal equation
- b) GB_Amplitude_freq.m: Plot basilar membrane velocity vs frequency (magnitude and phase)
- c) GB_P_F_combinedwave.m: Plot intracochlear pressure (Slow wave + Fast wave) vs frequency.
- d) GB_derived.m: Plot derived quantities vs frequency
- e) Lamda_plot_GB.m: Plot wavenumber vs distance from the stapes

-. Sub function lis

- f) Eiconal_sol.m: Call from eiconal_JASA.m, generate eiconal equation.
- g) bmpressure.m: Call from GB_P_F_combinedwave.m and GB_derived.m
- h) comp.m: Call from GB_P_F_combinedwave.m and GB_derived.m

2. How to run

-. Wavenumber calculation

- a) Put "Int_coch_P" folder under the "C:\MATLAB6p5\work\" directory.
- b) Create "wavenumber" folder under "Int_coch_P" folder.
- c) Create your own folder under "wavenumber" folder: ex) passive
- d) Run eiconal_JASA.m → Generate wavenumber for each frequency

-. Interested value plot

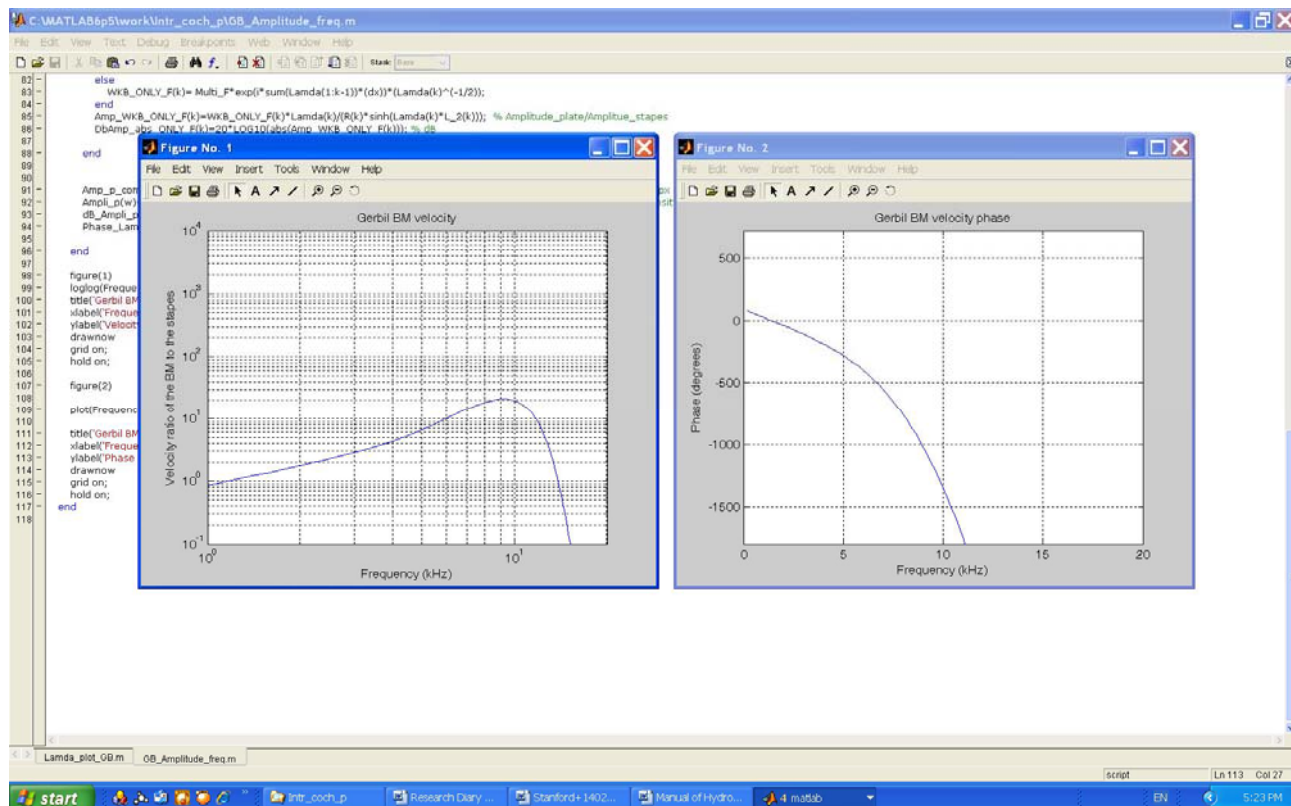
- a) Run Main files to plot → BM velocity and derived quantities vs frequency.

3. Examples

Ex. 1) BM velocity vs frequency

- i) Do 2.a) through 2.d) to generate wavenumber for each frequency.
- ii) Run (F5) GB_Amplitude_freq.m: Details are in the m file comment.
- iii) Set x and y ranges from Matlab figure module

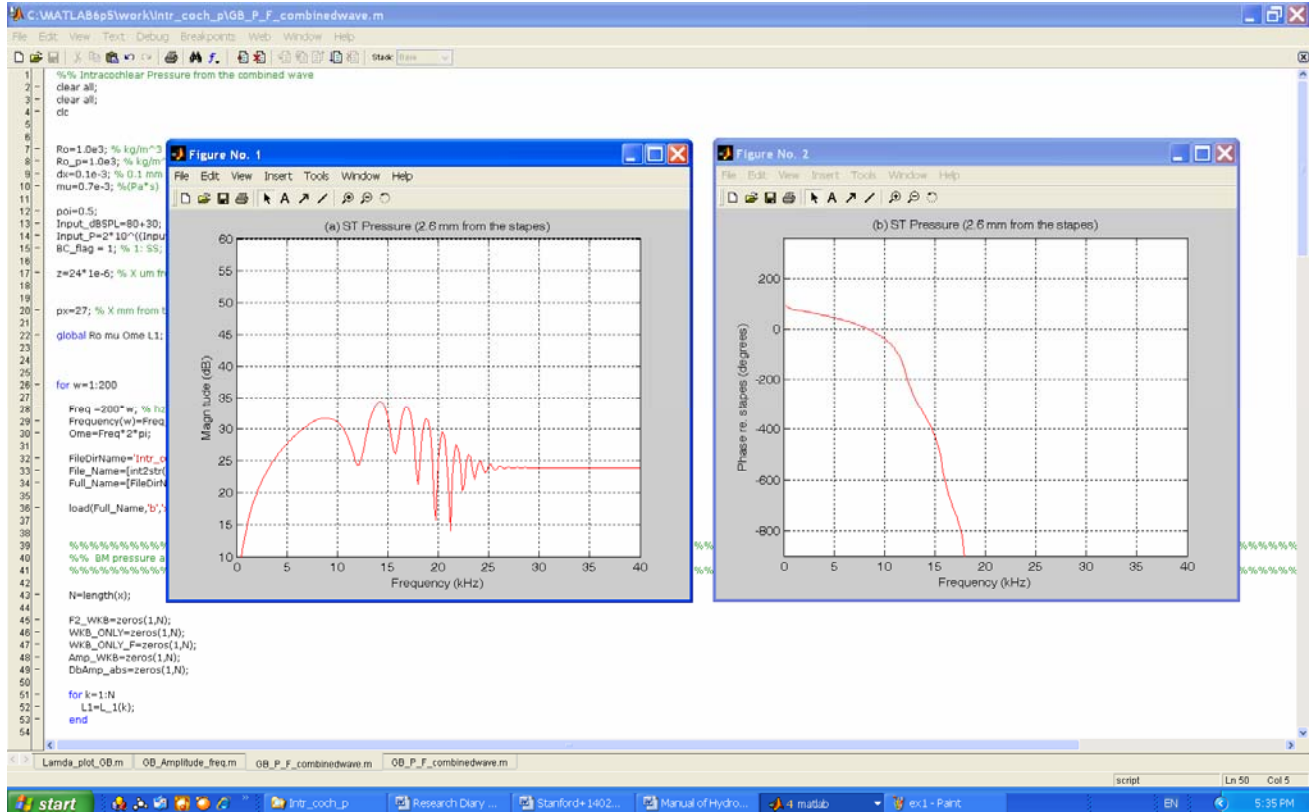
Results on your screen will be same as JASA Fig. 4a and 4b:



Ex. 2) Scala tympani intracochlear pressure vs frequency

- i) Do 2.a) through 2.d) to generate wavenumber for each frequency.
- ii) Run (F5) GB_P_F_combinedwave.m: Details are in the m file comment.
- iii) Set x and y ranges from Matlab figure module

Results on your screen will be same as JASA Fig. 6c and 6d:



Ex. 3) Derived quantities (V_{bm} , ΔP_{oc} , and Z_{oc}) vs frequency

- i) Do 2.a) through 2.d) to generate wavenumber for each frequency.
- ii) Run (F5) GB_derived.m: Details are in the m file comment.
- iii) Set x and y ranges from Matlab figure module

Results on your screen will be same as JASA Fig. 8c and 8d, Fig 9c and 9d, and Fig 10c and 10d:

