



# User's Manual for GWiP program

# "Guided Waves in Plates"

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#### **Description:**

GWiP allows the user to calculate Rayleigh-Lamb phase and group velocity dispersion curves and wave structures from isotropic material property input. The Global Matrix Method is used to solve for mode solutions and wave structures.

### Installation:

0. Requirements: 64-bit Windows OS, an internet connection, and administrator privileges.

1. Connect to your computer the disk which contains the installation file.

2. Double-click the installation file and follow the directions. Internet access is required during installation. The installer will automatically access the internet in order to download and install the Matlab Compiler Runtime Engine (MCR). The MCR is a necessary component of the GWiP program.

## Instructions:

1. Open the program by right-clicking "GWiP.exe" and selecting "run as administrator." If you do not run the program as an administrator, you may not have the ability to save data files into the program folder. If you do not have administrator privileges, copy "GWiP.exe" and the data files out of the "Program Files" directory. Then you will be able to run the program by double-clicking.

#### 2. To "Load" existing data

a. Enter file name without the *.mat* extension, e.g., *GWiP\_test*, and click the "Load" button. Dispersion curve data will automatically plot. The wave structure plot will be reset.

b. Note that the file must be in the same directory as *GWiP.exe*.

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### 3. To "Calculate" new data.

a. Enter (isotropic) material properties: bulk longitudinal wave speed (c\_L), bulk shear wave speed (c\_T), density, and plate thickness.

b. Enter mode search properties: start and end frequency (f), the number of frequency steps (# pts), start and end phase velocity (cp), and the number of phase velocity steps (# pts). 'Start' and 'end' represent the range over which to search for guided wave mode solutions. A linear interpolation is used with the number of steps to calculate the search points. The program will search for a single mode solution between each of the phase velocity search points.

c. Enter a file name, e.g., *data01*. Data will automatically be saved with the .mat extension, e.g., *data01.mat*.

d. Click the "Calculate" button. Wait while the program calculates the guided wave mode solutions.

4. To select a point and plot the wave structure.

a. Selecting a point: Click the "Select a point" button. Choose a point from the phase velocity or group velocity dispersion curves. When a point is chosen, a data cursor will appear.

b. Plotting the wave structure: Click the "Plot wave structure" button. The wave structure will be displayed.

c. Switching between displacement and stress wave structure: The wave structure plot will show the variable indicated by the slider bar, either displacement or stress. To select, click the arrow at the left or right end of the slider bar.

The PWP program was created by Jason Philtron in 2014; some of the Matlab script was written by Huidong Gao.