

Each model to be analyzed has its own folder, such as “two-solid system” and “dof5_model” in the examples. Inside the model’s folder, there is a main.m file to call every other functions, the structure of the codes is showed in Figure 1. To finish the forced response analysis using continuation method under Harmonic Balance Method (HBM) assumption, we need to add “HBM Continuation Code mex” to matlab path.

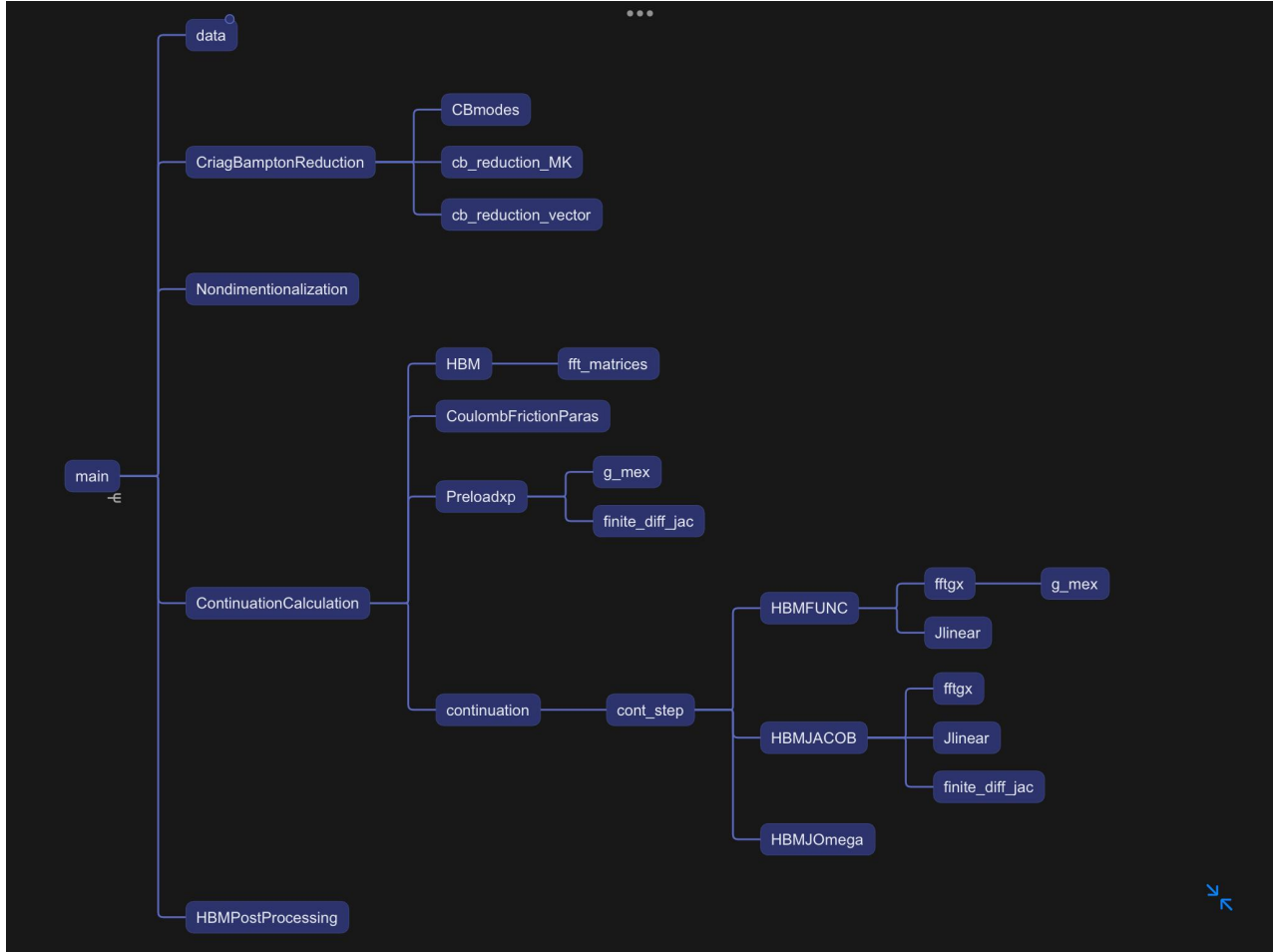


Figure 1: Structure of the codes

In main.m file, there are 5 main parts. In each part, we can see the details inside files.

First, the data.m file which in the same folder with main.m, we finish parameters setting. Include getting Finite Element Method (FEM) matrices, setting harmonics of external forces, HBM parameters, Newton Method parameters, Coulomb friction parameters and continuation parameters.

Second, Criag-Bampton (CB) reduction from FEM matrices. We can call the CriagBamptonReduction.m to finish the CB reduction. Or we also can directly read the CB matrices from CSV file or other file if we already have the CB matrices. In this case, FEM matrices are not needed in the first part.

Third, Nondimensionalization. We can define the different dimensionless parameters to different model, so this file stays together with main.m file.

Fourth, continuation calculation part, after all the parameters setting. We can do the calculation and get the x_{cont} and ω_{cont} frequency domain results for post processing in the fifth part.

Fifth, in the HBM post processing, we do the ifft to get the result in time domain to make the analysis.

Except data.m, Nondimensionalization.m and HBMPostProcessing.m, other functions and files are located in the folder “HBM Continuation Code mex”, which using g_mex function to calculate the friction forces coding in C++ and compile by matlab.

Other folders, “HBM Continuation Code Matlab” has the g function coding in 100% matlab language which we can see the calculation logic. But it’s much slower than using g_mex .

We can create a new folder for the new model each time, then copy the main.m, data.m, Nondimensionalization.m and HBMPostProcessing.m as templates pasting to the folder and modifying.