..One-way coupled FNPT-RANS model for wave-structure interaction problems...

FNPT ----> IITM-FNPT2D

RANS ----> IITM-RANS3D

To basically understand, the wave properties from "IITM-FNPT2D" is given as a input to "IITM-RANS 3D"

Before Proceeding with the simulation, if OpenFOAM or any c++ compiler is not installed, you may need to run the following command once

\*\*\*\*\*One Time execution\*\*\*\*\*\*\*

sudo apt update

sudo apt install build-essential

**Obtaining Wave Informations From IITM-FNPT2d For Running Simulation In IITM-RANS 3D:**

Step 1: Generate Wave paddle signal

i) Go to 1.PADDLE-SIGNAL folder and open the terminal window

a) Compile the "SOLITARY\_WAVE\_PADDLE\_DISP.CPP" using the command

"g++ SOLITARY\_WAVE\_PADDLE\_DISP.CPP -O2" (This is Capital O followed by 2 it is not zero)

You will see a.out file in the folder which you are working.

b) For running the compiled code use the following command

"./a.out"

Thus, you wavepaddle.dat is created in your 1.PADDLE-SIGNAL folder which contains wave paddle time history. Copy wavepaddle.dat to 2.IITM-FNPT2D

Step 2: Generate Wave using IITM-FNPT2D

i) Go to 2.IITM-FNPT2D folder and open the terminal window

a) For running the compiled fnpt code use the following command

"./fnpt"

You may need to change the permission if the permission denied error arise when executing this command. Use the following command in such a case

"chmod +x fnpt"

and then execute the above command

Thus, you Output\_PHI.dat is created in your 2.IITM-FNPT2D folder which contains time history of wave parameters like wave height, velocity, acceleration,P at the coupling zone.Copy Output\_PHI.dat to 3.NSE-INPUT-EXTRACTION

Step 3: Go to 3.NSE-INPUT-EXTRACTION and open the terminal window

a) Compile the "FNPT\_to\_NS.CPP" using the command

"g++ FNPT\_to\_NS.CPP -O2" (This is Capital O followed by 2 it is not zero)

You will see a.out file in the folder which you are working.

b) For running the compiled code use the following command

"./a.out"

Thus, the time history of wave properties from the FNPT Domain is extracted, interpolated and traced the same to the NS domain.

Step 4:Copy "Interp\_pf.dat", "Interp\_Ustag.dat" and "Interp\_Wstag.dat" from 3.NSE-INPUT-EXTRACTION to the folder: "5.IITM-RANS3D".

**Patching the cylinder for IITM-RANS 3D:**

Step 5: Go to 4.SOLID-PATCH and open the terminal window

a) Compile the "FNPT\_to\_NS.CPP" using the command

"g++ VOF\_INIT.c -O2" (This is Capital O followed by 2, it is not zero)

You will see a.out file in the folder which you are working.

b) For running the compiled code use the following command

"./a.out"

Thus, the Cylinder Patch is ready. Copy CYLINDER.DAT to "5.IITM-RANS3D".

**Running simulation in IITM-RANS 3D:**

Step 6: Go to 5.IITM-RANS3D and open the terminal window

a) Compile the "FNPT\_to\_NS.CPP" using the command

"g++ 3-D\_TWO-PHASE-NSE.CPP -O2" (This is Capital O followed by 2, it is not zero)

You will see a.out file in the folder which you are working.

b) For running the compiled code use the following command

"./a.out"

Thus, the simulation starts running.