

MEng Project Log

by

Jincong Li

M.Eng, The University of British Columbia, 2024

8th May, 2024

© Jincong Li, 2024

Contents

1	8th May	5
2	9th May	5
3	10th May	5
3.1	Important Functions	5
3.2	Case 1: Lid Driven Cavity	6
3.3	Files	6
3.4	Multiprocess	6
4	13th May	6
4.1	Steps to Simflow	7
4.2	Case4: Complie	7
4.3	Multiphase	7
5	14th May	7
5.1	Sockeye	8
5.2	Submit job	8
6	15th May	8
7	16th May	8
8	21th May	8
9	22th May	8
9.1	Output	8
9.2	Initialization of multiphase	9
9.3	Killing waves	9

9.4 multiple jobs	9
10 23th May	9
10.1 Work for DTMB5415	9
11 24th May	10
11.1 Work	10
12 27th May	10
12.1 Work for DTMB5415	10
13 28th May	11
13.1 Work for DTMB5415	11
14 3rd June	11
14.1 Work for DTMB5415	11
14.2 Work for wave	11
14.3 Meeting with Dr.Rajeev	11
15 4th June	12
15.1 Work for DTMB5415	12
15.2 Work for wave	12
16 5th June	12
16.1 Work for DTMB5415	12
17 6th June	12
17.1 Work for wave	12
18 7th June	12
18.1 Work for wave	12

19 13th June	13
19.1 Work for structural modes	13
19.2 Work for waves	13
20 14th June	13
20.1 Work for DTMB5415	13
21 17th June	13
21.1 Work for DTMB5415	13
22 18th June	14
22.1 Work for DTMB5415	14
23 19th June	14
23.1 Work for DTMB5415	14
24 20th June	14
24.1 Work for DTMB5415	14
25 24th June	14
25.1 Work for DTMB5415	14
26 2nd July	15
26.1 Work for DTMB5415	15
27 3rd July	15
27.1 Work for DTMB5415	15
28 4th July	15
28.1 Work for DTMB5415	15
29 5th July	16

29.1 Work for DTMB5415	16
30 7th July	16
30.1 Work for DTMB5415	16
31 10th July	16
31.1 Work for DTMB5415	16

1 8th May

1. Applied for the access to ICICS 227
2. Applied for the access to compute canada

2 9th May

1. Installed Gmesh, Paraview and get access to compute canada
2. Read Eigenfrequency analysis from COSMOL
3. Learn how to use Gmesh: geometry part and the mesh part with two case: vertical plane and cylinder
4. Install the Simflow

3 10th May

3.1 Important Functions

1. simflow : run simflow to solve
2. mpirun -nx simflowOmpi -npx
3. simGmshCnvt -msh *.msh :mesh
4. simPlt -type vtk : post processing
5. gmsh -3 : convert geo to msh
6. cd (home) .(current) ..(previous)
7. vi :q :w :q! : quit, write, write&quit, and quit without saving
8. cp (source) (destination) :copy
9. mv (source) (destination) :move
10. scp :copy from others computer
11. rm -r(folder)
12. scp -r ineogi@beluga.computecanada.ca: /scratch/CavityTutorial .
13. scp conroyli@beluga.computecanada.ca: /scratch/CavityTutorial/debug1/*.vtk .

3.2 Case 1: Lid Driven Cavity

1. 10 time steps with 0.1s
2. saved in 'debug1'
3. which simflow :give the location of the first version of simflow
4. /simflow-Nihar/bin/simflow
5. vi simflow.config
6. simPlt -type vtk -min 0 -last 10 in CavityTutorial

3.3 Files

1. cavity.geo
2. cavity.msh : save as msh
3. .crd .cnn .nbc(nodal BC) .srf
4. cavity.def
5. eightNodeBrick sixNodeWedge fourNodeTech
6. simGmshCnvt -msh Case1.msh

3.4 Multiprocess

1. InteractiveNode
2. salloc -ntasks=16 -account=def-rjaiman -time=1:0:0 -mem-per-cpu=4G
3. squeue
4. multiple cpu task: simflow.config
5. mpirun -n 16 /simflow-Nihar/bin/simflowOmpi -np 16

4 13th May

1. Fix Case1 files -> the problem should be in the mesh file
2. Check email for the lab access
3. Run Case2: sucessfully run and the vortec shedding is observed
4. Run Case3: VIV case with movable cylinder, follow the code project 1 article and try to reproduce the results.
5. Run Case4: wave-run-up case

4.1 Steps to Simflow

1. Mesh - Geometry - 3D/2D w 1 layer thick - physical groups - nbc srf - Mesh.MshFileVersion = 2.13;
2. Def file - geo -> msh - simflowCnvt
3. Post processing:
4. scp conroyli@beluga.computecanada.ca:/home/conroyli/scratch/Case1-plate/debug1/*.vtk
.
5. Paraview :vtk
6. MATLAB: Oisd Othd
7. Restart Simflow: Rst
- 8.

4.2 Case4: Complie

1. src - solbc.c - change the height.. - save and "make" in src
2. make clean to clear
3. make again
4. def - userdefined
- 5.

4.3 Multiphase

1. Allen-Calm (Phase field)
2. order parameter = ϕ from -1 to 1 (air to water)
3. src-solpro.c

5 14th May

1. /scratch/st-jelovica-1/ljc2018/
2. ljc2018@sockeye.arc.ubc.ca cwl password
- 3.

5.1 Sockeye

1. make clean
2. cp ../src-cc/src/y.* .
3. make

5.2 Submit job

1. computecanadajob.sh
2. sbatch
3. make

6 15th May

1. Case 4 wave-run up submitted
2. Case 3 VIV case submitted

7 16th May

1. Case 3 VIV case with corrected parameters submitted

8 21th May

1. N/A

9 22th May

9.1 Output

1. oisd → Integrated Force
2. othd → Nodal Time History
- 3.

9.2 Initialization of multiphase

1. x is the longitudinal, z is up and down
2. solProc.c line 377 $3i+2$ is the z coord, need + or -1
- 3.

9.3 Killing waves

1. Method 1: ship at 0.25 L of the domain and l as the ship length, domain: 15-20l and 5l for the very coarse
2. fine mesh in front, very coarse at the end
3. Method 2: solTimeInteg
4. damploc → start location of damping
- 5.

9.4 multiple jobs

1. change simMakeInp → run simMake → make: compile c++ → simflow and simflowOmpi
2. make clean + copy y files
3. Wavetank: $L=15+5m$, $H = 6m$, $W = 8m$
- 4.

Task: examine waves from 0.2-2m Jobs: height 0.8m & 1.6m and wave length 1m & 2m

1. 1: 0.8 & 1
2. 2: 0.8 & 2
3. 3: 1.6 & 1
4. 4: 1.6 & 2

10 23th May

10.1 Work for DTMB5415

1. Question: wave case not reasonable

2. Load the DTMP5415 ship model into gmsh
3. reverse it in the x-direction to have the head of the ship facing -x
4. scale the model down into 1:24.83 according to the Varhiala's thesis
5. re-run the testing case2 for the wave in 100 ts and 5 outFre to see if the input wave is functioning
6. $L_{pp} = 5.72 \text{ m}$ x→ -8m and 12m y→ +-10m z→ +-8.49/2m
7. 4 tests for wave are discard, new test with height = 0.5m and 3 1 3 "test5"
8. test5 failed → need to ask Ishan

11 24th May

11.1 Work

1. Question: how is the depth of the water defined in the solBc.c
2. need to consider the distance between the bottom of the model and the origin point
3. free surface to bottom of the ship is 0.248m
4. need to sizefield the mesh
5. wave is generated correctly now but to see if the amplitude is correct → Test6: 2000 time steps
6. mesh problem is solved, now need to refine the mesh according to the thesis
7. origin of the ship to the lowest point is 0.12m, so the wave should be generated at $0.284 \text{ m} - 0.12 \text{ m} = 0.164 \text{ m} + 2.46 \text{ m (min z)} =$
8. stp file needed in sockeye system? → use the msh file generated in Gmsh
9. how to control the Output? → timehistory
10. definition file? ALE and Multiphase together? → yes, all three together

12 27th May

12.1 Work for DTMB5415

1. makeup the definition file for DTMB 5415 ship simulation
2. copy from previous def files

3. solvesquence mode? dynamic or transient
4. U_{inf} is computed from Re to be 1.86515, so that the time step is 0.01s.
5. name of the mesh motion?
6. all Y to zero?
7. done modifying the definition file
8. msh conversion failed → ask Ishan

13 28th May

13.1 Work for DTMB5415

1. fix the msh and related files
2. wave height H_w is computed to be $LPP * 0.056 = 0.32032$
3. wave number ? k_w is $\frac{2\pi}{LPP} = 1.09845$
4. time period of wave T_w is $\frac{0.629 * LPP}{U_{\text{inf}}} = 1.929$
5. salloc –nodes=1 –account=st-jelovica-1 –time=1:0:0 –mem-per-cpu=4G
6. change the type of element on the srf to be threenodetriangle

14 3rd June

14.1 Work for DTMB5415

1. fix the DTMB5415 simulation
2. need to change the dir of Open MakeFile and change SIMFLOW-HOME to your directory

14.2 Work for wave

1. wave case test 7 with the src files given by Ishan for 100 timesteps → the test is success, the input is good
2. test 8 for longer times to see the damp out, 4000 steps with 200 out → run again

14.3 Meeting with Dr.Rajeev

1. next meeting on June 09 for industry

15 4th June

15.1 Work for DTMB5415

1. examine the result of DTMB test and test 8 and the TDP test.
2. more info on <http://www.simman2008.dk/5415/5415-geometry.html>

15.2 Work for wave

1. run the test 8 again with 4000 steps → still not working
2. `simPlt -type vtk -min 0 -last 10`

16 5th June

16.1 Work for DTMB5415

- 1.

17 6th June

17.1 Work for wave

1. the wave is correct in the wave run up case
2. so now, run the wave tank case with the same src file for test 9 and change the depth of the water as test 8
3. 1118420 is the 3m (test 8) → 1120985
4. 1118455 is the test 9 with the same solBc.c files with the wave run up case → 1120952

18 7th June

18.1 Work for wave

1. test 8 and 9 are both success
2. now need new tests for 1. wavelength 1 and everything else same → test1

3. 2. wave period 1 and everything else same → test2
4. 3. wave period 2.5 and everything else same → test3

19 13th June

19.1 Work for structural modes

1. got the Inp files
2. create the folders
3. run
4. run
5. comment out solTimeINteg.c line 530 damping codes
- 6.

19.2 Work for waves

1. comment out solTimeINteg.c line 530 damping codes

20 14th June

20.1 Work for DTMB5415

1. test for not moving ship to see if the domain is correct

21 17th June

21.1 Work for DTMB5415

1. test submitted last friday failed, need to check the boundary conditions in the definition file.
2. change dynamic to transient and reduce the iteration for non-linear calculation → re-run the test

22 18th June

22.1 Work for DTMB5415

1. examine the test submitted yesterday → tmr
2. use exactly the same definition file from the wave Tank case to see the difference → NmTest3 → failed
3. test 4 with my modified definition file → sim succeed → problem caused by highFreDampingFac?

23 19th June

23.1 Work for DTMB5415

1. since no error shown in the simflow, need to ask Ishan → ask Xiaoyu
2. since the simple waveTank case is success, Xiaoyu suggests to change piece by piece from the waveTank case to the ship case
3. so here is the procedure:
4. put the ship into the waveTank case domain run the sim see the result
5. need test 5 to see the effect of highFreDampingFac → need to ask xiaoyu

24 20th June

24.1 Work for DTMB5415

1. shift-x tests → move the entire domain to have the origin located at the inlet surface does not work
2. do not use simflowOmpi-DTMB use the same simflow exe as the waveTank case → test 6 (1316325)

25 24th June

25.1 Work for DTMB5415

1. want to see the effect of changing the domain

2. reduce y to 4m tests → reduce-y-test1 succeeded, not failing with simflow-1
3. with simflow-DTMB → test2

26 2nd July

26.1 Work for DTMB5415

1. `simGmshCnvt -msh *.msh`
2. `/* Hard code for inlet wave run-up */`
3. `H-wave = 0.32032 ; /* Wave height */`
4. `D-water = 3.0 ;//2.624 ; /* Water depth */`
5. `T-wave = 1.929; /* Wave period */`
6. `L-wave = 0.9108 ; /* Wave length */`
7. `PI = 3.14159265 ;`
8. `G = 9.81 ;`

27 3rd July

27.1 Work for DTMB5415

1. sockeye is not available currently
2. working on beluga
3. modifying files and setting up the sim

28 4th July

28.1 Work for DTMB5415

1. check the sim set up yesterday
2. DTMB5415 Tank test1 failed
3. increase y test succeed
- 4.

29 5th July

29.1 Work for DTMB5415

1. check the sim set up yesterday
2. need to check the moving case
3. try DTMB5415 moving (increase y) test2 with inertia and stiffness set to 1 → pending
- 4.

30 7th July

30.1 Work for DTMB5415

1. refine the mesh near the ship
2. ask for the ALE definition file from Ishan
3. why ale is not moving ?
4. how to track the heave response of the ship? probe on the ship? coordinates?
5. how to track the vertical fluid force?
6. try DTMB increase y test 2 with wave set up in the thesis
7. now the DTMB means the wave set up in the thesis
8. wave test set up is "wavetest"

31 10th July

31.1 Work for DTMB5415

1. test Gabin's file
2. check the calculation from the Vaibhav thesis
3. use the given definition file to run the simulation