Homework

Turbulence and CFD models: Theory and applications
Lectures 8-10

Single task

⚠ This homework is optional. ⚠

In tutorial 2 and homework 3 we dealt with a 3D pipe case using RANS models. Hereafter, you are asked to rerun the same case setup but using a LES model. You must compare the RANS solution with the LES solution and give a critical analysis of the outcome. You must complete the following tasks,

- Plot the Reynolds stresses and the turbulent kinetic energy in function of y^+ and the distance normal to the wall.
- Plot the laminar stress, turbulent stress, and total stress in function of y^+.
- Plot u^+ in function of y^+.
- Plot the contours of wall shear stresses.
- Plot the vortical structures using the Q-criterion (or any other criterion).
- Plot y^+, Δx, and Δz values on the walls.
- Plot in a cutplane the unsteady statistics, namely, mean values and RMS values of pressure and velocity.

To do the sampling and plotting along a line, you can choose a location close to the outlet of the pipe. Remember, you must compare the RANS solution against the outcome of the LES solution.

General guidelines

- Be technical and concise when written your report.
- You can write your report in English or Italian.
- Your case must be reproducible. This means that you should give enough information so anybody can reproduce your case and results.
- Do not hesitate to contact me if you have any questions.

Deadline

The deadline to submit your homework is 30 June 2020. You can send it to my email: joel.guerrero@unige.it

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