ME615 – Assignment 3

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Problem 1. Solve the external flow problem of flow past a 2-D body using OpenFoam open-source software. You may work in groups of two. The shape of the body will be assigned to you separately by the TA.

Deliverable: You will be expected to prepare a good quality Youtube video containing the following:

1. Model description with the governing differential equations and boundary conditions. You can use a paper, a smart board, ipad or a presentation to discuss these. (2 marks)

2. Instructing the user step-by-step about preparation of geometry and mesh in Gmsh or some other open-source code of your choice. (4 marks)

3. Discuss the solver options chosen and the reasons for the choice. Even if you are using standard options from another OpenFoam case, discuss them with their meaning. Solver options are contained in the system folder. (3 marks)

4. Results containing the following: (8 marks)

    - Grid independence analysis and the choice of final mesh size.
    - Flow streamlines and vectors with an analysis of flow behavior in key regions.
    - Effect of Reynolds number on coefficients of lift and drag and on the frequency of vortex shedding.

The results should be presented as high-quality graphs or animations in the video with appropriate discussion. No report is needed in the assignment. All setup files and final graphs should be submitted as a Github repository. Do not include result data files in the Github repository. (1 mark)

Two marks particularly for high-quality videos with good narration and presentation.

The videos should not be more than 60 minutes in length and you should ideally include Chapters in the video.

All videos from the assignment will be compiled into a public playlist for the rest of the world to learn from. Ensure that the videos meet that quality.