Addendum to Revised Version of Project 4 (Task 1 and 4)

Background

In the original release, the (now revised) deliverables for Task 1 and 4 were line plots of lift coefficient (C_L) *vs*. time for the transient simulations. Note that C_L is related to lift force (F_L) by

$$C_L = \frac{F_L}{\frac{1}{2}\rho U^2 A}$$

where ρ is density of fluid, U is the impending velocity, and A is the cross-sectional area of the solid object. Since Fluent has a built-in function to compute both C_L and F_L, our original instruction was to just use it to compute C_L for the relevant deliverables in Task 1 and 4. In that, we overlooked an issue that the parameters (ρ, U, A) that are required to convert F_L into C_L are not automatically updated by Fluent. Those values are stored in "Reference Values" and, for the purpose of computing C_L, need to be changed to the proper values associated to a particular run. It suffices to manually enter the 3 values. [One could also use "Compute from velocity inlet" for Reference Values, similar to "Step (7)" in Task 1 of Project 5, to update ρ, U, and manually change A.] For all runs in Task 1 and 4, the values of (ρ, U) are the same but A would change.

The issue will not affect the contour plots nor the computation of the lift/drag *force*. It will not affect Task 2 and 3.

Revised deliverables

Given that significant time has lapsed since the original release of the project, we revise the related deliverables such that those who have already completed the tasks will not need to redo them. We allow three options:

(1) Instead of showing lift coefficient C_L, make the line plots for lift *force*, F_L, in related deliverables in Task 1 and 4. This is now the official version of the revised deliverables. In the report, please state that "Option 1" is chosen.

(2) If the line plots for C_L have been made without using the correct values of (ρ, U, A), essentially one is showing F_L divided by an arbitrary constant ($= \frac{1}{2}\rho U^2 A$, where the parameters take the default values in Reference Values). Those plots are acceptable as is, with a statement that "Option 2" is chosen.

(3) If the line plots for C_L have been made with the correct reference values of (ρ, U, A), as described above, the plots are acceptable for the respective deliverables. There is no need to re-compute and show F_L. Please state that "Option 3" is chosen.

Please maintain consistency across relevant deliverables in Task 1 and 4. If an option is chosen, it must be used for all related deliverables. If the choice of option is not indicated in the report, we assume that "Option 1" is chosen.

We take "Option 1" as the official one to make it easier to accommodate those who have completed the tasks using "Option 2". [The phenomena shown in Video #3 in Lecture 24 pertain more closely to the variation of lift *force*. This is another reason that we choose Option 1 as the new official version.]