Computational Aerodynamics Questions & Answers

Question by Student 201227147

For subsonic outflow BC, you said that properties are extrapolated except P_1^{n+1}. And next, you wrote $u_1^{n+1} = 2u_2^n - u_3^n$ and $v_1^{n+1} = 2v_2^n - v_3^n$. At this case, can I just extrapolate them directly for subsonic outflow or should I follow the process that did for subsonic inflow?(obtaining M_1^{n+1}, α, etc)

You can extrapolate them directly for subsonic outflow. There is no need to obtain the Mach number needed to obtain the pressure and temperature from the stagnation properties (which are not used for subsonic outflow). **However,** you first need to obtain the Mach number perpendicular to the boundary $M_\perp$ to determine the wave speeds and whether the boundary condition is subsonic outflow or supersonic outflow. 1 point bonus.

Question by Student 201427564

Professor, I have a question about deriving Grid coverage index (2nd May class). When you divide

$$(\delta_x \phi)_f - (\partial_x \phi)_f = \frac{(\delta_x \phi)_f - (\delta_x \phi)_c}{1 - (\frac{\Delta x_c}{\Delta x_f})^P}$$

by

$(\delta_x \phi)_f$

you only divide numerator like this.

$$1 - \frac{(\partial_x \phi)_f}{(\delta_x \phi)_f} = \frac{(\delta_x \phi)_f - (\delta_x \phi)_c}{(\delta_x \phi)_f} \div (1 - (\frac{\Delta x_c}{\Delta x_f})^P)$$

Why did you not divide denominator? I don't think this is just a mistake.

Well, both the LHS and the RHS must be divided by the same amount. Thus, only the numerator on the RHS is altered. It wouldn't make sense to also divide the denominator.. 1 point bonus boost.

Question by Student 201427564

Professor, when I run paraview, the error occurred that can not open 'post.' data file. I checked Assign4 and Assign7 file, and there were no post.vtk file in Assign7. Is it a cause of this problem or something else?

If what you mean is that there is no post.vtk file in the tgz package, then this is normal. You need to create this post.vtk using warp of course. This is obvious..

Question by Student 201427564

Professor, Should I have to create post.vtk and data.01 files for each case? And I have another error ; 'tec360 : command not found'. Could you give me an advice?

Well yes, you should create those for each case. I don't recall mentioning in class about the use of tec360..? Why are you using this?

Question by Student 201427102

At "Coefficient form of discretization" You used 1st order formular for time deriviative But for x deriviative, you use 2nd order. Why you choose 2nd order??

This is a good question. If we choose 1st order, we'll face another problem other than the spurrious oscillations. I'll explain this again in class tomorrow. 2 points bonus.

Question by Student 201227147

Professor, I have a question about Assignment #7. Last class, you changed mf as 1, 2, and 4 and grid became as $21 * 21$, $41 * 41$, *and* $81 * 81$ *because is* $= 1$ *and* $ie = 1 + round(20 * mf)$. *But, I think ie should be* $round(20 * mf)$ *so that grid becomes* $20 * 20$, $40 * 40$, *and* $80 * 80$. *Why* $ie = 1 + round(20 * mf)$ *?*

This is to make sure that there is one node at $x = 0,\ y = 0$. If ie would be set to 20, 40, etc, instead of 21, 41, etc, then there wouldn't be a node precisely at the origin. 1 point bonus.