Computational Aerodynamics Questions & Answers

Question by Student 201238707

when we found velocity vector u_1^{n+1} & v_1^{n+1}. *we extrapolated* $u_1^{n+\frac{1}{2}}$ & $v_1^{n+\frac{1}{2}}$. *And we put* $\theta_1^{n+\frac{1}{2}} = \theta_1^{n+1}$ *then used*

$$\theta_1^{n+1} = atan(\frac{v_1^{n+1}}{u_1^{n+1}}) = atan(\frac{\alpha * v_1^{n+\frac{1}{2}}}{\alpha * v_1^{n+\frac{1}{2}}})$$

but i wonder why those θ *are same?*

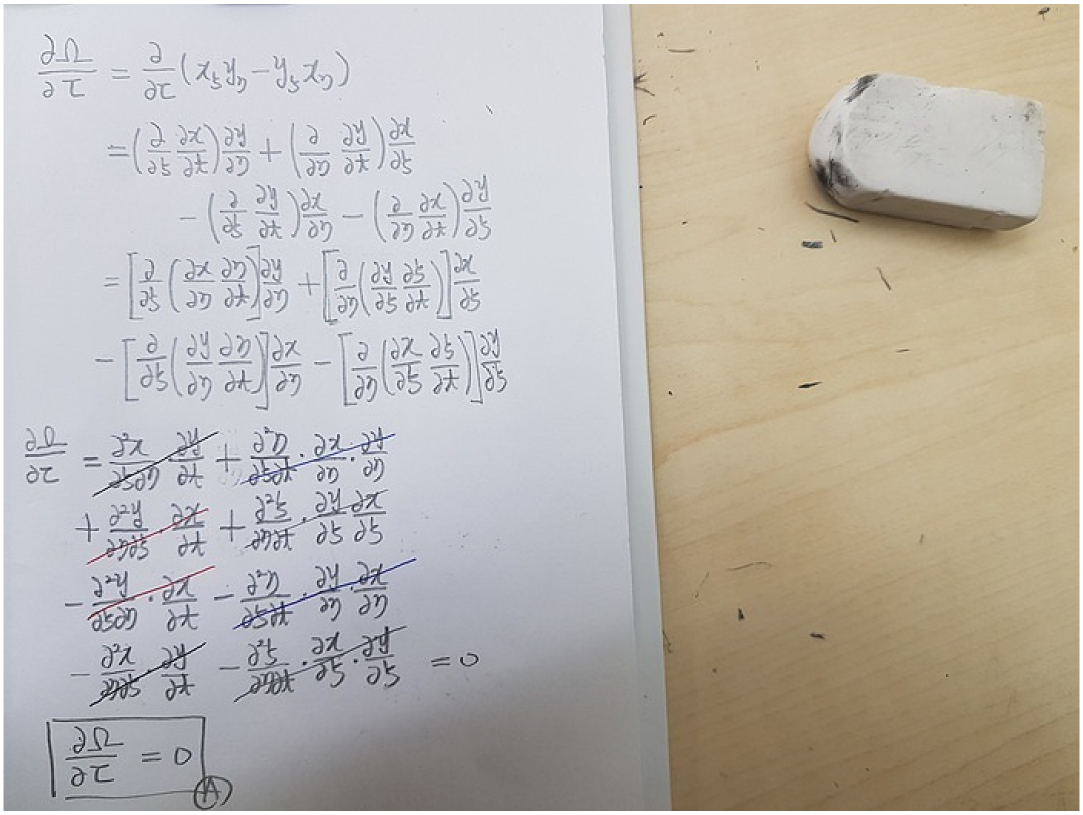
I don't understand. What other value would you give it?

Question by Student 201227147

Professor, in the section 2 of the table (Euler Equation in Generalized Coordinates), it says that $Q \equiv \Omega U$. *But I guess it should be* $Q \equiv \Omega\Gamma U$.

True, but $\Gamma = 1$, so it doesnt' matter in this case. 1 point bonus.

Question by Student 201327132



Professor, This is answer of thursday question. It is not relate that mesh doesn't change in time.

This is great! 2.0 points bonus. I would have given you 3 points bonus if you would have typeset it using LaTeX.

Question by Student 201327132

Professor, Assignment 2 deadline is described Tuesday 29th March. So That confused me.

Its due on Thursday. I fixed the mistake.

Question by Student 201327133

Professor, I have a question about τ. I understood that η and ξ mean each line number of horizontal and vertical grid. But i don't know what is physical meaning of τ. If i know that, it much easier to understand the class.

τ is the same as t because we set Γ to 1. 1 point bonus.

Question by Student 201327103

Professor, I think the problem is i and x are not in same direction. In previous example, i axis and x axis are in same direction. So that computer can decide x component first with setted space and than decide y component form equation

$y = sin(15x/L)H/20$

Here the space doesn't change with y But in this problem space change with x and y. So, computer may not find proper point of nodes which have setted space through $x^2 + y^2 = r^2$. Because I don't know the computer codes in detail, I can't approach to the solution.

You're on the right track. It has something to do with the fact that it's difficult to find a root for y on a circle at $x = \pm r_{\rm i}$. Because the method used to solve the equation within the Equation() command is a Newton-Raphson non-linear root solver, it may fail close to $x = \pm r_{\rm i}$ depending on the initial guess or the size of the first Δx given to the solver. Say for example that x is at $-r_{\rm i}$ and Δx is set to -10^{-10} m, then this will result in a negative value for y^2 in the Newton-Raphson procedure, and the Equation command will fail. I'll explain this better through an example next class. 2 points bonus.