Fundamentals of Fluid Mechanics B Questions and Answers

Ask your questions related to Fundamentals of Fluid Mechanics B in this thread. Use LaTeX to typeset mathematics. See LaTeX mini-HOWTO here:

https://overbrace.com/bernardparent/vie ... =13&t=1179

Question by AME536B Student

*in the note, why v*v=q^2 and what dose q represent at here.*

Use LaTeX when typesetting mathematics. It's not v*v but $v \cdot v$. It's not q^2 but q^2. Retype your question using LaTeX and I will answer it below.

Question by AME536A Student

When answering question 2.D on homework 1, is it necessary to make the assumption that the flow is inviscid, such that the viscous term:

$$\frac{\mu}{\rho}(\nabla \cdot \nabla)v$$

is zero? Or, are we unable to assume inviscid flow?

This can not be assumed. If you want to make such statement, it needs to be proven.

Question by AME536B Student

The majority of students in this class are also taking AME500B, which has a midterm on Friday. I also know that many of us are struggling with the various quiz questions that we are trying to correct (Gibbs question, mean free path question). I believe that most of us have prioritized this midterm over these questions/current assignment. I wanted to ask if you would consider postponing the quiz until Tuesday to allow us to better study for our midterm in 500B?

OK. The assignment will be due on Tuesday the 25th at 11:00 am.

Question by AME536B Student

Are both assignments $(4 \,\&\, 5)$ *due on the* 25^{th} *? and if so; are all the problems from both assignments need to be solve?*

No, I will make an announcement soon on the D2L.

Question by AME536B Student

For the assignment #4 question #4. By using the mass conservation equation and the theta momentum equation on cylindrical coordinates and by making some assumptions, we can obtain the following differential equation.

$\frac{\mu}{r}\frac{\partial}{\partial r}\left(r\frac{\partial v_\theta}{\partial r}\right)-\mu\frac{v_\theta}{r^2}=0$

This leads to a different result than the suggested one. I can understand that if we drop the term $\mu\frac{v_\theta}{r^2}$ *we will finally obtain the suggested solution, but I can't see a reason to drop that term. Is there a problem with the given solution?*

If you can integrate analytically your equation then do so. If you decide to neglect a term, then you need to justify your assumptions.

Question by AME536A Student

In assignment #2 question #4, could you give us a hint how to get from

$\overline{q_{rel}^2}=\overline{\vec{v}_{rel}\cdot\vec{v}_{rel}}=\overline{(\vec{v}_1-\vec{v}_2)\cdot(\vec{v}_1-\vec{v}_2)}$

to a definition of average relative molecular speed:

$\overline{q_{rel}}=\sqrt{\overline{q_1^2}+\overline{q_2^2}}$

where q's are the magnitudes of v's. Based on your hint in class, it seems like we can't just take the square root of $\overline{q_{rel}^2}$ *because this would not yield what we are looking for.*