Fundamentals of Fluid Mechanics B Questions and Answers

Another hint. For two streamlines near each other and at a certain location, one has a temperature T, and the other the temperature $T + dT$. Expand terms and get rid of the terms that are necessarily much smaller than the others.

Question by AME536B Student

Do we need to memorize proofs for this midterm?

The midterm is open book so you can consult your assignments, class notes, books if you want. However, if I were you, I would stick to consulting the tables: you won't waste time and score higher this way.

Question by AME536B Student

I was attempting to figure out the mean free path derivation question you gave us previously on how to get the

$$\sqrt{2}$$

term. What I came up with using your tip of

$$q_{rms} = c * q_{avg} \tag{1}$$

is,

$$\overline{V_{rel}^2} = \overline{V_1^2} + \overline{V_2^2} \tag{2}$$

Is this process correct?

I don't understand where your equation (2) is coming from. You need to clarify this.

Question by AME536B Student

On the tables, the equation given for the strain rate $S_{\theta r}$ in spherical coordinates has a term of $\frac{v_\theta}{r}$; is that a typo? Shouldn't the shear strain equation for spherical coordinates be given by:

$$S_{r\theta} = \frac{1}{2}\left(\frac{1}{r}\frac{\partial v_r}{\partial \theta} + \frac{\partial v_\theta}{\partial r}\right)$$

The equation in the tables is correct: there is no typo.

Question by AME536A Student

For question 1. b. on Assignment 6, do you want us to derive the expression you gave for the streamfunction? Or just start from the given equation?

If it's given in the question don't derive it.

Question by AME536B Student

For problem 3b. Do we need to derive the Oseen's stream function or can we use the stream function provided in class and in the tables?

Use the one in the tables, don't derive it.

Question by AME536B Student

For problem 3 on HW 6, can we assume that the droplet spends a much more significant time at terminal velocity than it does getting to terminal velocity, and thus say that: time=\frac{Distance}{Terminal Velocity}