

# Fundamentals of Fluid Mechanics B

## Questions and Answers

### Question by AME536B Student

*Could you provide a hint on Q1 from HW 8? Should I start with the continuity eq. and assume that  $u = u(x, y)$  instead of assuming that  $u = u(y)$  ?*

Yes, that's how this problem should be started.

### Question by AME536A Student

*Should we be able to derive the general solution of the streamfunctions we found for Stokes and Oseen's solution?*

Well, it's open book, so you can always consult your notes for this matter if you don't remember how the Stokes streamfunction was derived. But I won't ask you the part of the derivation that I didn't do in class or that I didn't ask you to do in the assignments.

### Question by AME536B Student

*Is assignment 10 included on what we have to study for the exams?*

Of course. This was mentioned in class.

### Question by AME536A Student

*Could you give us a hint on HW 7, Q2? Should the explanation about the difference of the Reynolds solution and the exact solution be a verbal explanation, focusing on the difference in the equations we solved?*

Yes, the explanation of the differences between Reynolds and Blasius can be "verbal". That is, you can simply put down in written form the verbal explanation you would give to others as to why there is a large discrepancy. You can include some math expressions if this makes your explanation easier to follow. Note that both are exact solutions.

### Question by AME536A Student

*Regarding the last question. I've been focusing my explanation on the difference in*

*the equations we're solving and the assumptions that are involved. I'm not sure if pointing out these differences is explanation enough. If not, could you give a hint on what I have to think about?*

You need to explain why there are discrepancies between the solutions obtained despite the latter all originating from the Navier-Stokes and despite Reynolds and Blasius being both exact solutions to the boundary layer phenomenon. How is this possible? Explain things in simple terms so that they are readily understandable to someone with basic knowledge in fluid mechanics.

### **Question by AME536B Student**

*In HW9, Q4b and 4c, I am not sure if (a) or (b) are the right assumptions or if both of them are wrong. Could you provide a hint please?*

(a)  $\frac{u_w}{U_\infty} = \text{constant}$

(b)  $\frac{u_w}{v} = \text{constant}$

*if (b) is used,  $v$  will be calculated from the continuity eq.*

See my answers above for similar questions. You need to make sure that the way you define the height works well equally when  $u_w$  is much less than  $u_\infty$  and when  $u_w$  everywhere in the profile is more than  $0.99999999u_\infty$ . I mentioned in class specifically that (a) is improper. Why are you writing this here? As for (b), I see many problems with a  $v$  on the denominator.. Ask yourself this question: where is  $v$  approaching 0? This will occur at several locations..