Fundamentals of Fluid Mechanics B Questions and Answers

Question by AME536B Student

I am working on Assignment 4, Question 3, Part E:
The solution for the problem is
$\dot{m_A} = \frac{\rho_A D}{\mu_A}(\frac{\tau_i H^2}{18} - \frac{1}{81}\frac{\partial P}{\partial x})$
but this answer is not dimensionally homogeneous.
Shouldn't the answer be:
$\dot{m_A} = \frac{\rho_A D}{\mu_A}(\frac{\tau_i H^2}{18} - \frac{H^3}{81}\frac{\partial P}{\partial x})$

Yes that's correct. I fixed this typo in the answers.

Question by AME536A Student

I have a question about prob #3 in the assignment 3. Is the pressure gradient in the x-direction 0?

Yes, but you need to justify this.

Question by AME536A Student

In the prob #3 in the assignment 3, the external force to push piston in x-direction should be balanced with the shear force acting on the surface of piston?

Correct.

Question by AME536B Student

For assignment 4, question #3(a), is it possible to find an explicit expression for the pressure distribution along y with no unknowns in the expression?

Yes, the relative pressure (with respect to the pressure measured say at $x = 0, y = 0$), can be expressed as a function of $\partial P/\partial x$ and the known fluid properties such as viscosity and density only.

Question by AME536B Student

would you be willing to allow us to turn in HW #04 at 11:59 pm rather than 11:00

am tomorrow?

No, the deadline is at 11:00 am. Submit whatever you've got by 11:00 and you can do a revision and submit it a second time next week if you wish.

Question by AME536A Student

For prob #3 in the assignment 4, is there no pressure gradient in y-direction?

The pressure varies both along x and along y. Thus, $P = P(x, y)$ as written in the answers.