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Courses » Adiabatic Two-Phase Flow and Flow Boiling in Microchannel

Announcements **Course** Ask a Question Progress

Unit 5 - Week 4

Course outline

Assignment 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2016-10-07, 05:25 IST.

1) For air-water flow through a microchannel (air flowing at 0.3 m/s and water at 0.5 m/s), find out the in-situ void fraction (α) using Armand correlation. Given: the constant K = 0.8 *1 point*

- 0.375
- 0.3
- 0.6
- 0.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.3

2) Void fraction (α) is related to in situ gas velocity (u_G) and inlet gas velocity (j_G) as *1 point*

- $\alpha = j_G/u_G$
- $\alpha = j_G u_G$
- $\alpha = j_G + u_G$
- $\alpha = u_G/j_G$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\alpha = j_G/u_G$

3) In-situ vapor velocity (u_G) can be measured by *1 point*

- Computerized image analysis of high speed high definition image sequences
- Method based on conservation of mass
- Using laser diode technique
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

4) Match the following *1 point*

1) Stratified flow	a) Dispersed flow
2) Bubbly flow	b) Mixed / Transition flow
3) Churn flow	c) Separated flow
4) Annular flow	

- 1-c, 2-a, 3-a, 4-c
- 1-c, 2-b, 3-a, 4-c

- 1-c, 2-a, 3-b, 4-c
- 1-a, 2-c, 3-b, 4-a

No, the answer is incorrect.
Score: 0

Accepted Answers:
1-c, 2-a, 3-b, 4-c

5) Which of the following is NOT an assumption of Homogeneous flow model *1 point*

- Two fluids are uniformly mixed and moving as a pseudo-fluid at the mixture velocity
- Slip velocity between two phases are considered
- Attainment of thermodynamic equilibrium between phases
- Average properties of two fluids are taken as the property of the pseudo phase

No, the answer is incorrect.
Score: 0

Accepted Answers:
Slip velocity between two phases are considered

6) The problems associated with pressure drop measurement in microchannels are *1 point*

- Several losses to be included (bends, expansions, contractions)
- High uncertainties in measurements of conduit diameter, fluid properties, flow rates
- High viscous dissipation leading to variations in fluid density at wall for heated tubes
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

7) *1 point*

Water (2 kg/s) and air (0.005 kg/s) flow through a conduit at conditions where homogene flow model can be assumed. Calculate the two phase viscosity (in Pa.s) using Beattie and Whalley equation.

$\mu_{AIR} = 1.983 \times 10^{-5}$ Pa.s $\quad \mu_{WATER} = 10^{-3}$ Pa.s

$\rho_{AIR} = 1.225$ kg/m^3 $\quad \rho_{WATER} = 1000$ kg/m^3

- 9.977×10^{-4}
- 2.240×10^{-5}
- 6.894×10^{-4}
- 8.960×10^{-4}

No, the answer is incorrect.
Score: 0

Accepted Answers:
8.960×10^{-4}

8) Two phase multiplier (gas phase) is expressed as *1 point*

- $$\Phi_G^2 = \left(\frac{dp}{dz}\right)_{fr,TP} \Big/ \left(\frac{dp}{dz}\right)_{fr,G}$$
- $$\Phi_G^2 = \left(\frac{dp}{dz}\right)_{fr,TP} \times \left(\frac{dp}{dz}\right)_{fr,G}$$
- $$\Phi_G^2 = \left(\frac{dp}{dz}\right)_{fr,G} \Big/ \left(\frac{dp}{dz}\right)_{fr,TP}$$

$$\Phi_G^2 = \left(\frac{dp}{dz}\right)_{fr,TP} + \left(\frac{dp}{dz}\right)_{fr,G}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\Phi_G^2 = \left(\frac{dp}{dz}\right)_{fr,TP} \Big/ \left(\frac{dp}{dz}\right)_{fr,G}$$

9) What does the “single phase liquid flow” assumption indicate in the unit cell approach of Slug Flow Model? ***1 point***

- Gas and liquid phases flowing through the conduit is assumed to flow as a single pseudo phase
- The pressure drop is assumed to be same as that encountered when the liquid flow alone through the conduit
- The liquid slug is assumed to be free of entrained air
- The liquid film thickness around the gas plug is assumed to be negligible

No, the answer is incorrect.
Score: 0

Accepted Answers:
The liquid slug is assumed to be free of entrained air

10) Martinelli parameter is expressed as ***1 point***

$$\chi^2 = \left(\frac{dp}{dz}\right)_{fr,G} \Big/ \left(\frac{dp}{dz}\right)_{fr,L}$$

$$\chi^2 = \left(\frac{dp}{dz}\right)_{fr,L} \times \left(\frac{dp}{dz}\right)_{fr,G}$$

$$\chi^2 = \left(\frac{dp}{dz}\right)_{fr,L} \Big/ \left(\frac{dp}{dz}\right)_{fr,G}$$

$$\chi^2 = \left(\frac{dp}{dz}\right)_{fr,L} + \left(\frac{dp}{dz}\right)_{fr,G}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\chi^2 = \left(\frac{dp}{dz}\right)_{fr,L} \Big/ \left(\frac{dp}{dz}\right)_{fr,G}$$

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