FLUID MECHANICS

TESTS

Attention: there might be more correct answers to the questions.

Chapter 6: Measurement in fluid mechanics

T.6.1.1 The dimensions of the surface-tension constant σ are

a, kg/m^2

b, kg/s^2

c, kg/m^3

d, N/m

e, none of them are correct.

The answer is:

T.6.1.2 The pressure difference between the inside of a bubble and the atmospheric pressure

a, is directly proportional to the diameter

b, is inversely proportional to the diameter

c, is inversely proportional to the surface

d, is directly proportional to the volume,

c, is independent of the diameter

The answer is:

T.6.1.3A U-shaped communicating vessel is made of glass, and is filled with water. One of its branches is a capillary with a small diameter. The pressure directly under the water level in the capillary is

a, smaller, than the environmental pressure

b, bigger, than the environmental pressure

c, equals to the environmental pressure

d, the rise of the waterspout increases as the capillary diameter increases

e, the rise of the waterspout increases as the capillary diameter decreases

The answer is:

T.6.2.1 There is an inclined manometer (α=30°), filled with alcohol (ρ=800kg/m^3). The surface height change in the reservoir is negligible. The liquid surface in the inclined pipe is H=200mm higher than the reservoir surface, g=9,81N/kg. The pressure difference (Δp) is:

a, 784,8 Pa

b, 78,48 Pa

c, 0,57x10^6 Pa

d, 1570 Pa

e, none of them are correct.

The answer is:

T.6.3.1 How can you express the flow rate, given the velocity field($\underline{v}$), and the surface(A)?

a, $q_v = \int \rho v dA$

b, $q_v = \oint \underline{v} d\underline{s}$

c, $q_v = \int_A \underline{v} d\underline{A}$

d, $q_v = \int_A vdA$

e, $q_v = \sum_{i=1}^{n} v_i \Delta A_i$

The answer is:

T.6.3.2 We can use the following expression for the measurement with a constrictor element:

a, $q_v = \alpha\varepsilon \frac{d^2\pi}{4} \sqrt{\frac{\rho}{2}}\, \Delta p_m$

b, $q_v = \varepsilon \frac{d^2\pi}{4} \sqrt{\frac{\rho}{2}} \sqrt{\Delta p_m}$

c, $q_v = \alpha\varepsilon \sqrt{\frac{d^2\pi}{4} \frac{2}{\rho}} \sqrt{\Delta p_m}$

d, $q_v = \alpha\varepsilon \frac{d^2\pi}{4} \sqrt{\frac{2}{\rho}} \sqrt{\Delta p_m}$

The answer is:

T.6.3.3 The correct expression for calculating velocity from a measurement with a Pitot-static tube (Prandtl probe) is:

a, $v = \sqrt{\frac{2\, p_{din}}{\rho}}$

b, $v = \sqrt{\frac{2}{\rho}} p_{st}$

c, $v = \sqrt{\frac{2}{\rho}} p_{ö}$

d, $v = \sqrt{\frac{2 p_{ö}}{\rho}}$

e, $v = \sqrt{\frac{2\, p_{st}}{\rho}}$

The answer is:

T.6.4.1 In order to correctly model the flow around a moving body in the wind tunnel

a, the body has to be moved in the wind tunnel

b, the velocity field in the wind tunnel has to be uniform

c, the atmospheric turbulence has to be modelled correctly

d, the fluid turbulence has to be as low as possible.

The answer is:

T.6.4.2 The cross-section closure ratio

a, is the ratio of the body and the air stream cross-section

b, is the ratio of the air stream and the body cross-section

c,should have a value of 0.05-0.1

d,should have a value of 0.2-0.4

The answer is:

T.6.4.3 Assuming that the velocity, the temperature and the size of the body is constant, the increasing pressure of the flowing air in the wind tunnel:

a, increases the Reynolds number

b, decreases the Reynolds number

c, increases the Mach number

d, doesn't influence the Mach number

e, decreases the Mach number.

The answer is: