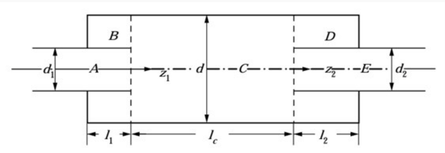
Assignment_12

The due date for submitting this assignment has passed.

Due on 2021-04-14, 23:59 IST.

As per our records you have not submitted this assignment.

1) Consider the concentric extended-inlet and extended-outlet circular muffler shown below. *1 point*



To incorporate the effect of higher-order modes generated at the sudden-area discontinuities, it is necessary to consider in the modal expansion,

- [ ] the plane wave modal term and the radial modal terms in the chamber, annular cavities and inlet/outlet ports for regions A to E
- [ ] the complete three-dimensional modal terms including circumferential modes must be considered for regions A to E
- [ ] an axisymmetric or a two-dimensional model
- [ ] plane wave modal term and radial modes in B, C and D, however, radial and circumferential modes must be considered in the ports

No, the answer is incorrect.
Score: 0

Accepted Answers:
the plane wave modal term and the radial modal terms in the chamber, annular cavities and inlet/outlet ports for regions A to E
the complete three-dimensional modal terms including circumferential modes must be considered for regions A to E

2) For the annular cavity regions B and D with $d/d2 = 0.2$, the non-dimensional resonance for the first radial mode$(k_0 R_2)_{0,1}$ = *1 point*

- 3.8317
- 4.2358
- 6.3932
- 1.8412

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.2358

3) For the configuration shown in Q.1, take $l = l_1 + l_c + l_2 = 282.3mm, d1 = d2 = 48.6mm, d = 153.2mm,$ *1 point*
sound speed c0 = 346.1 m/s. The tuned extension lengths l1 and l2 required to nullify the first and second trough corresponding to the chamber resonance frequencies is given by

- 11 = 141.6 mm, 12 = 70.8 mm
- 11 = 131.6 mm, 12 = 61 mm,
- 11 = 131.6 mm, 12 = 70.8 mm
- 11 = 151.6 mm, 12 = 80.8 mm

No, the answer is incorrect.
Score: 0

Accepted Answers:
11 = 131.6 mm, 12 = 61 mm,

4) Now, consider the effect of wall-thickness on the extension lengths as given by the empirical relation developed by Chaitanya and Munjal: *1 point*

$$\frac{\delta}{d} = a_0 + a_1\left(\frac{D}{d}\right) + a_2\left(\frac{t_w}{d}\right) + a_3\left(\frac{D}{d}\right)^2 + a_4\left(\frac{D}{d}\,\frac{t_w}{d}\right) + a_5\left(\frac{t_w}{d}\right)^2$$

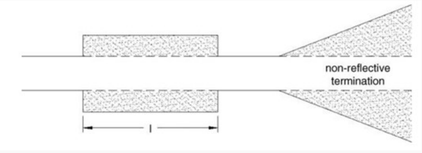
Here, $a_0 = 0.005177,\ a_1 = 0.0909,\ a_2 = 0.537,\ a_3 = -0.008594,\ a_4 = 0.02616, a_5 = -5.425;$ d and t_w are diameter and wall thickness of the inner inlet/outlet tube; and D is the (equivalent) shell diameter.
In the above problem Q.3, take the wall-thickness $t_w = 2mm$. The tuned-lengths are now approximately given by

- 11 = 141.6 mm, 12 = 70.8 mm
- 11 = 131.6 mm, 12 = 61 mm,
- 11 = 128.9 mm, 12 = 58.3 mm
- 11 = 153.9 mm, 12 = 83.1 mm

No, the answer is incorrect.
Score: 0

Accepted Answers:
11 = 128.9 mm, 12 = 58.3 mm

5) Consider the absorptive muffler configuration shown below: *1 point*



For attenuation constant α_0 and length l, the attenuation of a forward moving wave is given by the expression

- $8.68\alpha_0 l$
- $8.68\frac{\alpha_0}{l}$
- $0.12\alpha_0 l$
- $\alpha_0 l$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$8.68\alpha_0 l$

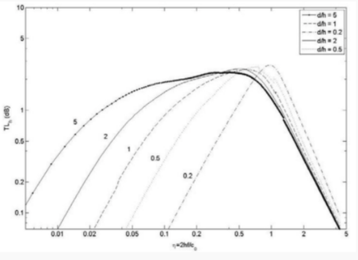
6) The specific transmission loss TL_h of a lined duct is defined as *1 point*

- attenuation produced when the length l of the lined duct is equal to the thickness h of lining
- attenuation produced when the length equals unity
- attenuation produced when the entire length l when a stationary medium (zero Mach number) is considered

No, the answer is incorrect.
Score: 0

Accepted Answers:
attenuation produced when the length l of the lined duct is equal to the thickness h of lining

7) Consider a circular duct of diameter D = 600 mm, length L = 4 m lined with highly porous ploryurethane foam material of 100 mm thickness from *1 point*
inside. Take sound speed $c_0 = 346m/s$, and use the chart below which plots the specific TL_h versus non-dimensional frequency.



The acoustic attenuation or TL produced at 1000 Hz is given by

- 100 dB
- 52 dB
- 88 dB
- 12 dB

No, the answer is incorrect.
Score: 0

Accepted Answers:
100 dB

8) For the same lined duct, what is the TL produced at 4000 Hz? *1 point*

- 100 dB
- 52 dB
- 88 dB
- 12 dB

No, the answer is incorrect.
Score: 0

Accepted Answers:
12 dB