Assessment_7

The due date for submitting this assignment has passed.

Due on 2021-03-10, 23:59 IST.

As per our records you have not submitted this assignment.

1) In context of aeroacoustic state-variables, what remains constant across a sudden-area discontinuity? ***1 point***

- only the pressure
- only the mass velocity
- both pressure and mass velocity
- neither of them

No, the answer is incorrect.
Score: 0

Accepted Answers:
only the mass velocity

2) The loss coefficient K for an extended-inlet element, and the [**T**] matrix relating the aeroacoustic state-variables for this junction is given by ***1 point***

- $$\left(\frac{Sd}{Su}-1\right)^2\begin{bmatrix}1 & KM_1Y_1\\ \frac{S_2}{S_2Z_2+S_3M_3Y_3} & \frac{S_2Z_2-M_1Y_1(KS_3-S_1)}{S_2Z_2+S_3M_3Y_3}\end{bmatrix}$$
- $$\frac{\left(1-\frac{Sd}{Su}\right)}{2},\begin{bmatrix}1 & KM_1Y_1\\ 0 & 1\end{bmatrix}$$
- $$\left(\frac{Sd}{Su}-1\right)^2,\begin{bmatrix}1 & KM_1Y_1\\ \frac{-S_2}{-S_2Z_2+S_3M_3Y_3} & \frac{-S_2Z_2-M_1Y_1(KS_3+S_1)}{-S_2Z_2+S_3M_3Y_3}\end{bmatrix}$$
- $$0.5,\begin{bmatrix}1 & KM_1Y_1\\ \frac{-S_2}{-S_2Z_2+S_3M_3Y_3} & \frac{-S_2Z_2-M_1Y_1(KS_3-S_1)}{-S_2Z_2+S_3M_3Y_3}\end{bmatrix}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\left(\frac{Sd}{Su}-1\right)^2\begin{bmatrix}1 & KM_1Y_1\\ \frac{S_2}{S_2Z_2+S_3M_3Y_3} & \frac{S_2Z_2-M_1Y_1(KS_3-S_1)}{S_2Z_2+S_3M_3Y_3}\end{bmatrix}$$

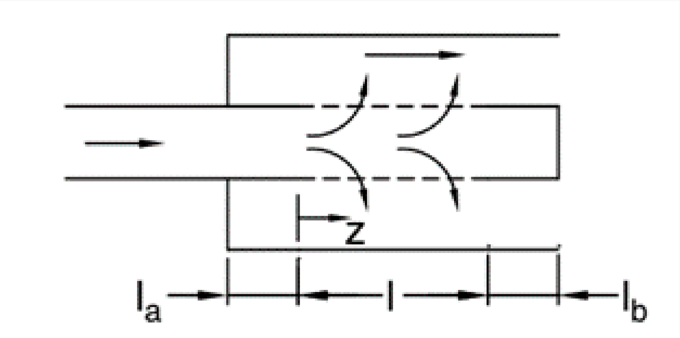
3) One of the main reasons to use a perforated bridge is ***1 point***

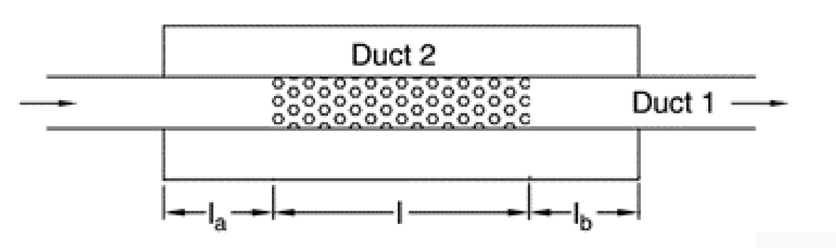
- not to allow the flow to expand or contract suddenly to eliminate flow-separation noise
- take advantage of dissipative effect at perforates, i.e., the resistive part of the impedance to enhance the attenuation
- allow acoustic waves to have only a limited access to the annular cavity
- none of the above

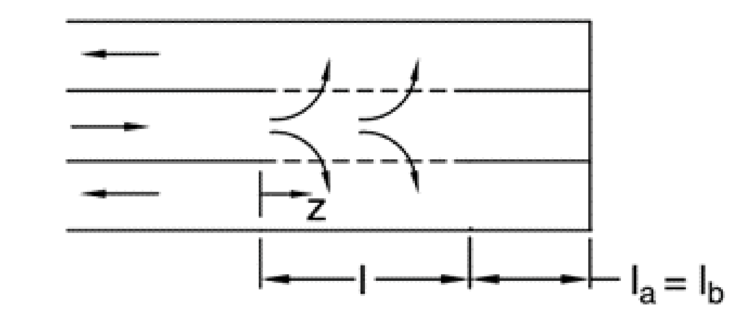
No, the answer is incorrect.
Score: 0

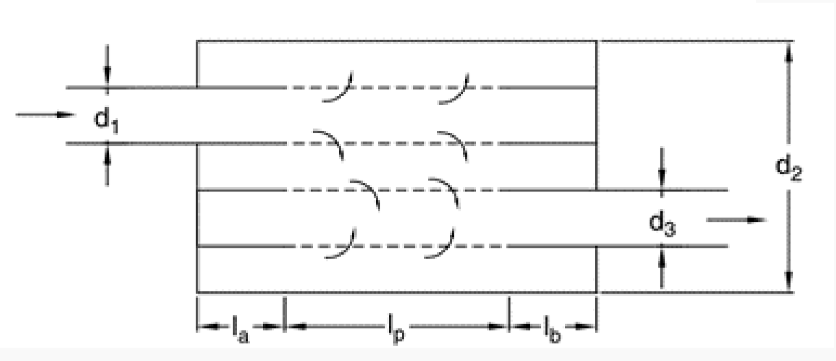
Accepted Answers:
not to allow the flow to expand or contract suddenly to eliminate flow-separation noise
take advantage of dissipative effect at perforates, i.e., the resistive part of the impedance to enhance the attenuation

4) Which of the following is referred to as the cross-flow expansion element? ***1 point***



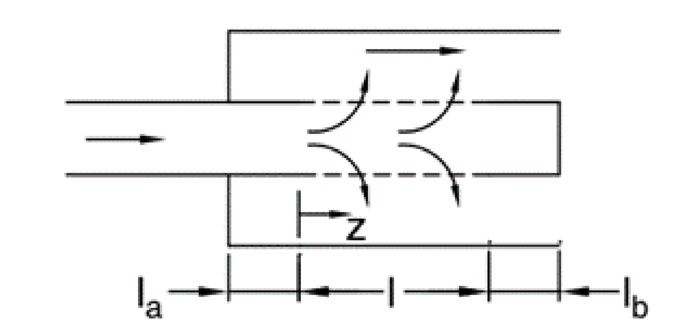


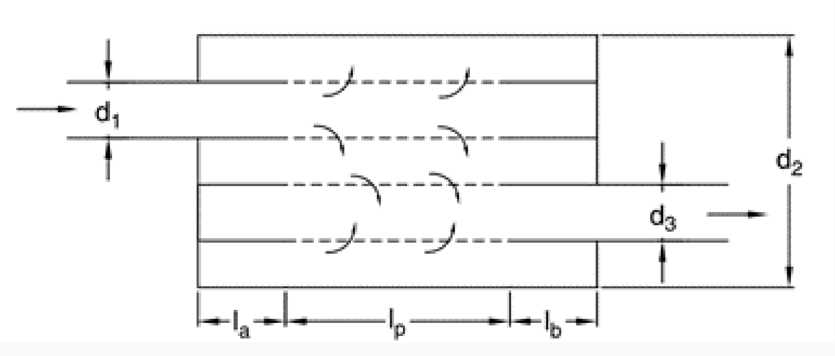




No, the answer is incorrect.
Score: 0

Accepted Answers:





5) In the presence of mean flow (grazing or bias), the following statement(s) is/are correct for perforated duct mufflers ***1 point***

- peaks are lowered significantly whilst troughs are somewhat raised due to non-zero resistive part of the perforate impedance
- negligible effect on the attenuation performance
- the convective effect of mean flow can be ignored whilst the more important dissipative effect needs to be retained through perforate impedance expression
- cannot make a general comment

No, the answer is incorrect.
Score: 0

Accepted Answers:
peaks are lowered significantly whilst troughs are somewhat raised due to non-zero resistive part of the perforate impedance
the convective effect of mean flow can be ignored whilst the more important dissipative effect needs to be retained through perforate impedance expression

6) Consider a 2-duct interacting duct problem such as a concentric tube resonator (CTR). Such a muffler configuration is governed by set of ***1 point***

- two coupled 2nd order ODE with acoustic pressure in ducts as variables
- 4 first-order coupled ODEs with acoustic pressure and acoustic velocity in each duct as variables
- 6 first-order coupled ODEs in with acoustic pressure and acoustic velocity in each duct as variables
- 2nd order wave equation

No, the answer is incorrect.
Score: 0

Accepted Answers:
two coupled 2nd order ODE with acoustic pressure in ducts as variables
4 first-order coupled ODEs with acoustic pressure and acoustic velocity in each duct as variables

7) For the CTR muffler configuration having extensions of length l_a and l_b at the inlet and outlet, respectively, the BCs at the beginning and end of the perforated region is given by ***1 point***

- $$Z_2(0)=\frac{\tilde{p}_2(0)}{\tilde{u}_2(0)}=-j\rho_0c_0\cot(k_0l_a),\ Z_2(0)=\frac{\tilde{p}_2(l)}{\tilde{u}_2(l)}=-j\rho_0c_0\cot(k_0l_b),$$
- $$Z_2(0)=\frac{\tilde{p}_2(0)}{\tilde{u}_2(0)}=-j\rho_0c_0\tan(k_0l_a),\ Z_2(0)=\frac{\tilde{p}_2(l)}{\tilde{u}_2(l)}=-j\rho_0c_0\cot(k_0l_b),$$
- $$\tilde{u}_2(0)=0\ \ \tilde{u}_2(l)=0$$
- none of the above

(Here, 1 denotes the duct region whilst 2 denotes the annular cavity)

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$Z_2(0)=\frac{\tilde{p}_2(0)}{\tilde{u}_2(0)}=-j\rho_0c_0\cot(k_0l_a),\ Z_2(0)=\frac{\tilde{p}_2(l)}{\tilde{u}_2(l)}=-j\rho_0c_0\cot(k_0l_b),$$

8) A double-tuned CTR muffler configuration of overall chamber length L has ***1 point***

- an extended-inlet with length l_a slightly less than L/2 and an extended-outlet with lengthl_b slightly less than L/4
- an extended-inlet with length l_a slightly less than L/4 and an extended-outlet with length l_b slightly less than L/2
- with no extensions at inlet and outlet
- inlet and outlet extension lengths exactly equal to L/2 and L/4, respectively.

No, the answer is incorrect.
Score: 0

Accepted Answers:
an extended-inlet with length l_a slightly less than L/2 and an extended-outlet with lengthl_b slightly less than L/4
an extended-inlet with length l_a slightly less than L/4 and an extended-outlet with length l_b slightly less than L/2