Assignment_8

The due date for submitting this assignment has passed.

Due on 2021-03-17, 23:59 IST.

As per our records you have not submitted this assignment.

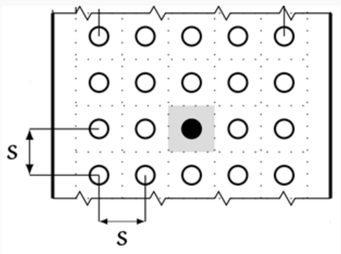
1) In context with the double-tuned extended-tube resonator and a double-tuned extended concentric tube resonator (ECTR), which of the following statement(s) is/are true? ***1 point***

- [ ] Acoustic resonance frequency of the tuned extended-tube muffler is influenced by the quarter wave resonators of the extended tube lengths only, whilst that of the ECTR is influenced by the tube-cavity resonance of the perforates as well as the quarter-wave resonator lengths of the extended tubes.
- [ ] Acoustic action of the ECTR is very different from that of the corresponding double-tuned extended tube chamber.
- [ ] For a highly porous extended CTR having porosity greater than 30%, one can replace its acoustic attenuation analysis with that of the extended-tube resonator.
- [ ] Mean flow does not have a significant influence on the tuned lengths and attenuation peaks of the ECTR.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Acoustic resonance frequency of the tuned extended-tube muffler is influenced by the quarter wave resonators of the extended tube lengths only, whilst that of the ECTR is influenced by the tube-cavity resonance of the perforates as well as the quarter-wave resonator lengths of the extended tubes.
Acoustic action of the ECTR is very different from that of the corresponding double-tuned extended tube chamber.

2) Consider the distribution of circular holes given below. ***1 point***



The hole diameter $d_h = 3mm$ and the inter-hole spacing, i.e., center-to-center distance s = 6.8 mm. The porosity σ is approximately given by

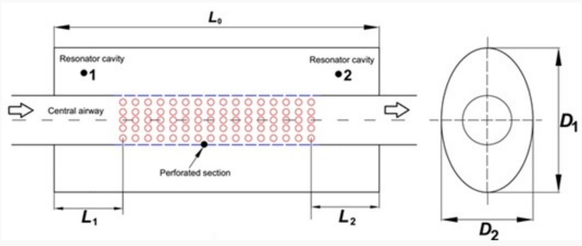
- ( ) 10.5%
- ( ) 15.3%
- ( ) 28.8%
- ( ) 20%

Q.3 to Q.5 require the use of MATLAB.

No, the answer is incorrect.
Score: 0

Accepted Answers:
15.3%

3) Consider the straight-through flow ECTR muffler configuration shown below. ***1 point***



The design challenge is to double-tune the ECTR configuration to obtain a broadband transmission loss performance. The overall chamber length $L_0 = 400mm$, take $D_1 = D_2 = D_0 = 150mm$, airway diameter $d_0 = 50mm$, and a nominal porosity $\sigma = 10\%$, hole diameter and thickness both equal to 3 mm. Consider a stationary medium, and ambient temperature $T_0 = 20$ degrees and assume only planar wave propagation in the annular cavity and airway. Use the perforate impedance given in the paper by Elnady et al. (Journal of Vibration and Acoustics, ASME 2010) presented in this week's lecture.

The tuned geometrical lengths L_1 and L_2 is approximately given by

- [ ] 200 mm, 100 mm
- [ ] 173 mm, 75 mm
- [ ] 227 mm, 125 mm
- [ ] 75 mm, 173 mm

No, the answer is incorrect.
Score: 0

Accepted Answers:
173 mm, 75 mm
75 mm, 173 mm

4) In Q.3, all geometric and physical parameters remain same except porosity which should now be taken equal to 30%. In this case, the tuned geometrical lengths L_1 and L_2 is approximately given by ***1 point***

- ( ) 182.5 mm, 86.5 mm
- ( ) 200 mm, 100 mm
- ( ) 217.5 mm, 113.5mm
- ( ) 190.5mm, 101.5 mm

No, the answer is incorrect.
Score: 0

Accepted Answers:
182.5 mm, 86.5 mm

5) Now consider a grazing mean flow $m_g = 0.1$ in the central airway, while the porosity is fixed at 30%. At frequencies close to the first and second resonance frequencies of the chamber, the transmission loss (in dB) is approximately given by ***1 point***

- ( ) 12.6 and 14.6
- ( ) 0 at both frequencies
- ( ) 5.8 and 6.1
- ( ) attenuation peaks occur at these frequencies

No, the answer is incorrect.
Score: 0

Accepted Answers:
12.6 and 14.6