

LABORATORUL DE MECANICĂ ȘI ACUSTICĂ

f Hz	l m	$\bar{l}$ m	$\lambda$ mm	$v_s$ m/s
900	0.1750 0.1770 0.1770	0.1763	352.6	317.34
950	0.1740 0.1830 0.1850	0.1806	361.2	343.14
1000	0.1720 0.1720 0.1700	0.1713	342.6	342.60
1050	0.1610 0.1580 0.1600	0.1596	319.2	335.15
1100	0.1580 0.1530 0.1560	0.1556	311.2	342.32

$$\lambda = 2l$$

$$\bar{v}_s = \frac{v_{s1} + \dots + v_{s5}}{5}$$

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (v_{si} - \bar{v}_s)^2}{n(n-1)}}$$

$$\varepsilon = \frac{\sigma}{\bar{v}_s} \cdot 100$$

$$\bar{l}_{900} = \frac{l_1 + l_2 + l_3}{3} = \frac{0.1750 + 0.1770 + 0.1770}{3} = \frac{0.529}{3} = 0.1763 \text{ m}$$

$$\lambda_{900} = 0.1763 \text{ m} \cdot 2 = 0.3526 \text{ m} = (0.3526 \cdot 1000) \text{ mm} = 352.6 \text{ mm}$$

$$= \bar{l}_{900} \cdot 2$$

$$v_{s900} = 0.1763 \text{ m} \cdot 2 \cdot 900 \text{ Hz} = 0.3526 \text{ m} \cdot \frac{900}{\lambda} = 317.34 \text{ m/s}$$

$$= \bar{l}_{900} \cdot 2 \cdot f$$

$$\bar{v}_s = \frac{\sum_{i=1}^5 v_{si}}{5} = \frac{v_{s1} + v_{s2} + v_{s3} + v_{s4} + v_{s5}}{5} =$$

$$= \frac{317.34 + 343.14 + 342.60 + 335.15 + 342.32}{5} = \frac{1680.55}{5} =$$

$$= 336.11 \text{ m/s}$$

$$\sigma = \sqrt{\frac{(v_{s1} - \bar{v}_s)^2 + (v_{s2} - \bar{v}_s)^2 + \dots + (v_{s5} - \bar{v}_s)^2}{5(5-1)}}$$

$$(v_{s1} - \bar{v}_s)^2 = (317.34 - 336.11)^2 = (-18.77)^2 = 352.3129 \quad (1)$$

$$(v_{s2} - \bar{v}_s)^2 = 49.4208 \quad (2)$$

$$(v_{s3} - \bar{v}_s)^2 = 42.1201 \quad (3)$$

$$(v_{s4} - \bar{v}_s)^2 = 0.9216 \quad (4)$$

$$(v_{s5} - \bar{v}_s)^2 = 38.5640 \quad (5)$$

$$(1, 2, 3, 4, 5) \Rightarrow \sigma = \sqrt{\frac{352.3129 + 49.4208 + 42.1201 + 0.9216 + 38.5640}{5 - 1}}$$

$$= \sqrt{\frac{483.3394}{20}} = \sqrt{24.16697} = 4.9159 = \sigma$$

$$\varepsilon = \frac{4.9159}{336.11} \cdot 100 = \frac{491.59}{336.11} = 1.4625\%$$