

{P 2.17}

R_01=10.e-6

R_02=100.e-6

R_03=500.e-6

gamma=1.4

P_L=101330.

T_L=298.

rho_L=1000.

sigma=0.071

omega_01=sqrt(3.*gamma*P_L/(rho_L*R_01^2))

f_01=omega_01/(2.*pi)

omega_02=sqrt(3.*gamma*P_L/(rho_L*R_02^2))

f_02=omega_02/(2.*pi)

omega_03=sqrt(3.*gamma*P_L/(rho_L*R_03^2))

f_03=omega_03/(2.*pi)

rho_a=density(air, P=P_L, T=T_L)

omega_21=sqrt((24.*sigma)/(R_01^3*(3.*rho_a+2.*rho_L)))

omega_22=sqrt((24.*sigma)/(R_02^3*(3.*rho_a+2.*rho_L)))

omega_23=sqrt((24.*sigma)/(R_03^3*(3.*rho_a+2.*rho_L)))

f_21=omega_21/(2.*pi)

f_22=omega_22/(2.*pi)

f_23=omega_23/(2.*pi)

R₀₁ = 0.00001R₀₂ = 0.0001R₀₃ = 0.0005 γ = 1.4P_L = 101330T_L = 298 ρ_L = 1000 σ = 0.071

$$\omega_{01} = \sqrt{3 \cdot \gamma \cdot \frac{P_L}{\rho_L \cdot R_{01}^2}}$$

$$f_{01} = \frac{\omega_{01}}{2 \cdot \pi}$$

$$\omega_{02} = \sqrt{3 \cdot \gamma \cdot \frac{P_L}{\rho_L \cdot R_{02}^2}}$$

$$f_{02} = \frac{\omega_{02}}{2 \cdot \pi}$$

$$\omega_{03} = \sqrt{3 \cdot \gamma \cdot \frac{P_L}{\rho_L \cdot R_{03}^2}}$$

$$f_{03} = \frac{\omega_{03}}{2 \cdot \pi}$$

$$\rho_a = \rho [\text{'Air'} , P = P_L , T = T_L]$$

$$\omega_{21} = \sqrt{\frac{24 \cdot \sigma}{R_{01}^3 \cdot [3 \cdot \rho_a + 2 \cdot \rho_L]}}$$

$$\omega_{22} = \sqrt{\frac{24 \cdot \sigma}{R_{02}^3 \cdot [3 \cdot \rho_a + 2 \cdot \rho_L]}}$$

$$\omega_{23} = \sqrt{\frac{24 \cdot \sigma}{R_{03}^3 \cdot [3 \cdot \rho_a + 2 \cdot \rho_L]}}$$

$$f_{21} = \frac{\omega_{21}}{2 \cdot \pi}$$

$$f_{22} = \frac{\omega_{22}}{2 \cdot \pi}$$

$$f_{23} = \frac{\omega_{23}}{2 \cdot \pi}$$

SOLUTION

Unit Settings: [J]/[K]/[Pa]/[kg]/[degrees]

$$f_{01} = 328332$$

$$f_{21} = 146776$$

$$\gamma = 1.4$$

$$\omega_{03} = 41259$$

$$\omega_{23} = 2608$$

$$\rho_L = 1000$$

$$R_{03} = 0.0005$$

$$f_{02} = 32833$$

$$f_{22} = 4641$$

$$\omega_{01} = 2.063E+06$$

$$\omega_{21} = 922219$$

$$P_L = 101330$$

$$R_{01} = 0.00001$$

$$\sigma = 0.071$$

$$f_{03} = 6567$$

$$f_{23} = 415.1$$

$$\omega_{02} = 206297$$

$$\omega_{22} = 29163$$

$$\rho_a = 1.185$$

$$R_{02} = 0.0001$$

$$T_L = 298$$

1 potential unit problem was detected.