Rezonátoros hangelnyelők

Mérnöki Akusztika oktatási segédlet, 2014.

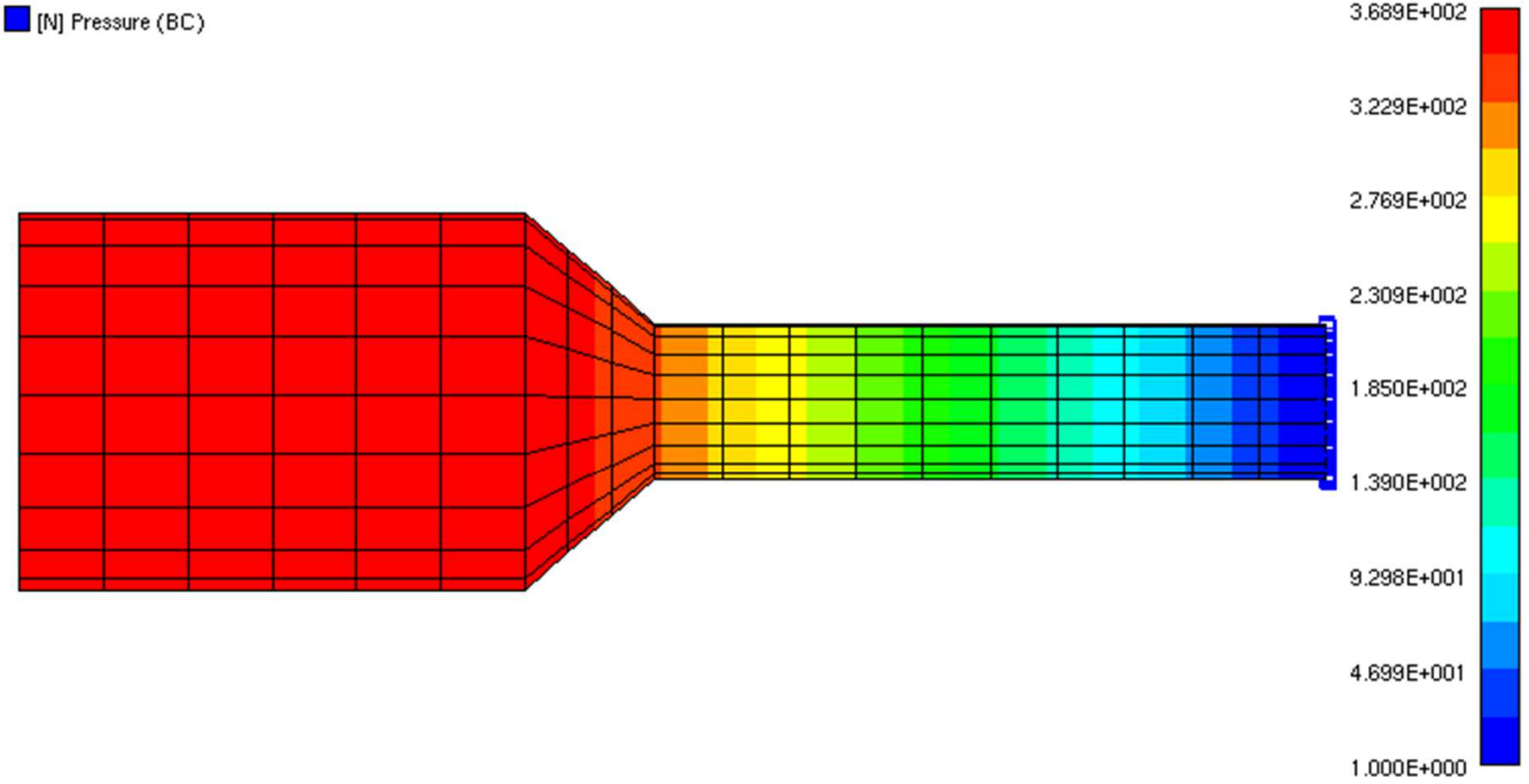
Augusztinovicz Fülöp

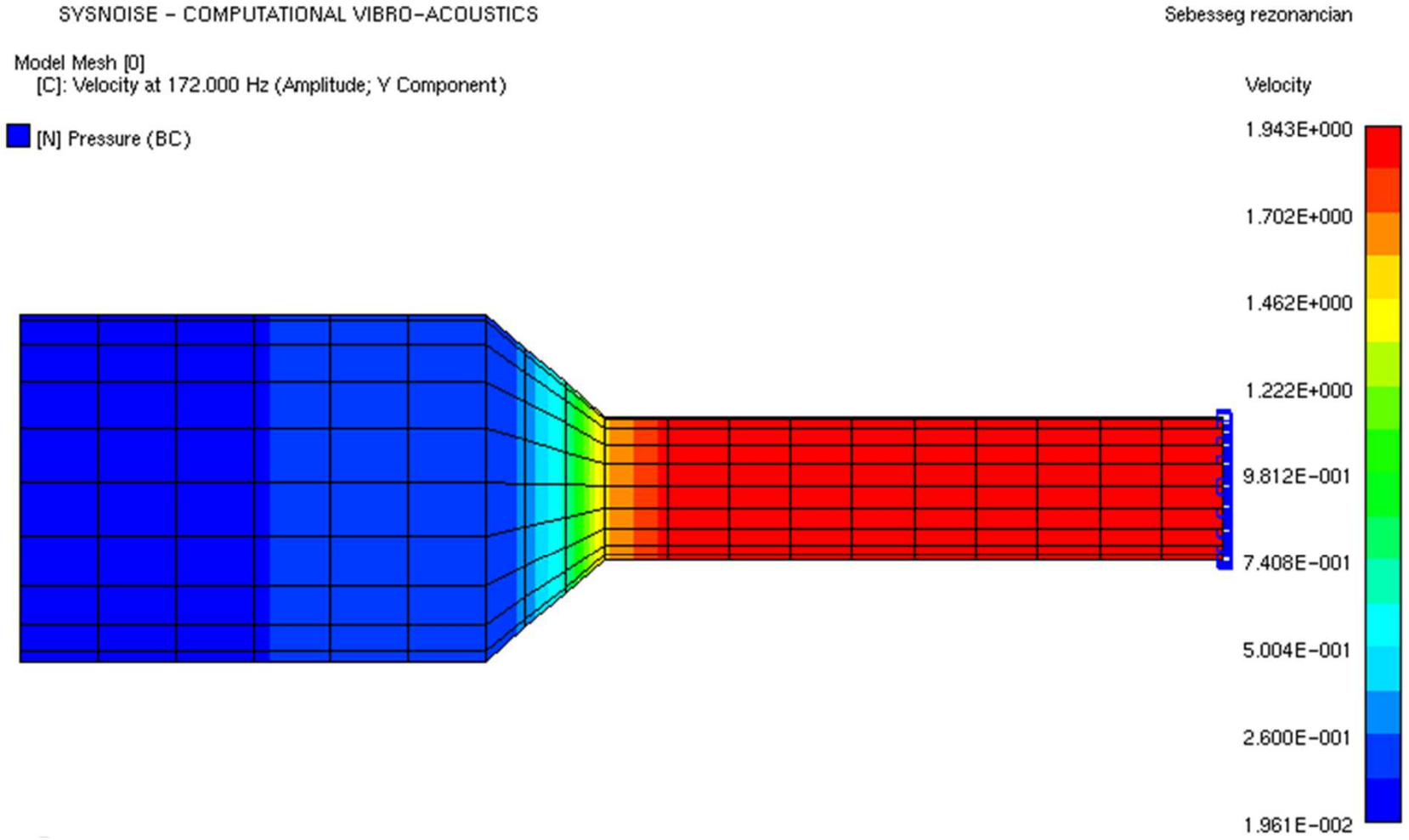
SYSNOISE – COMPUTATIONAL VIBRO–ACOUSTICS

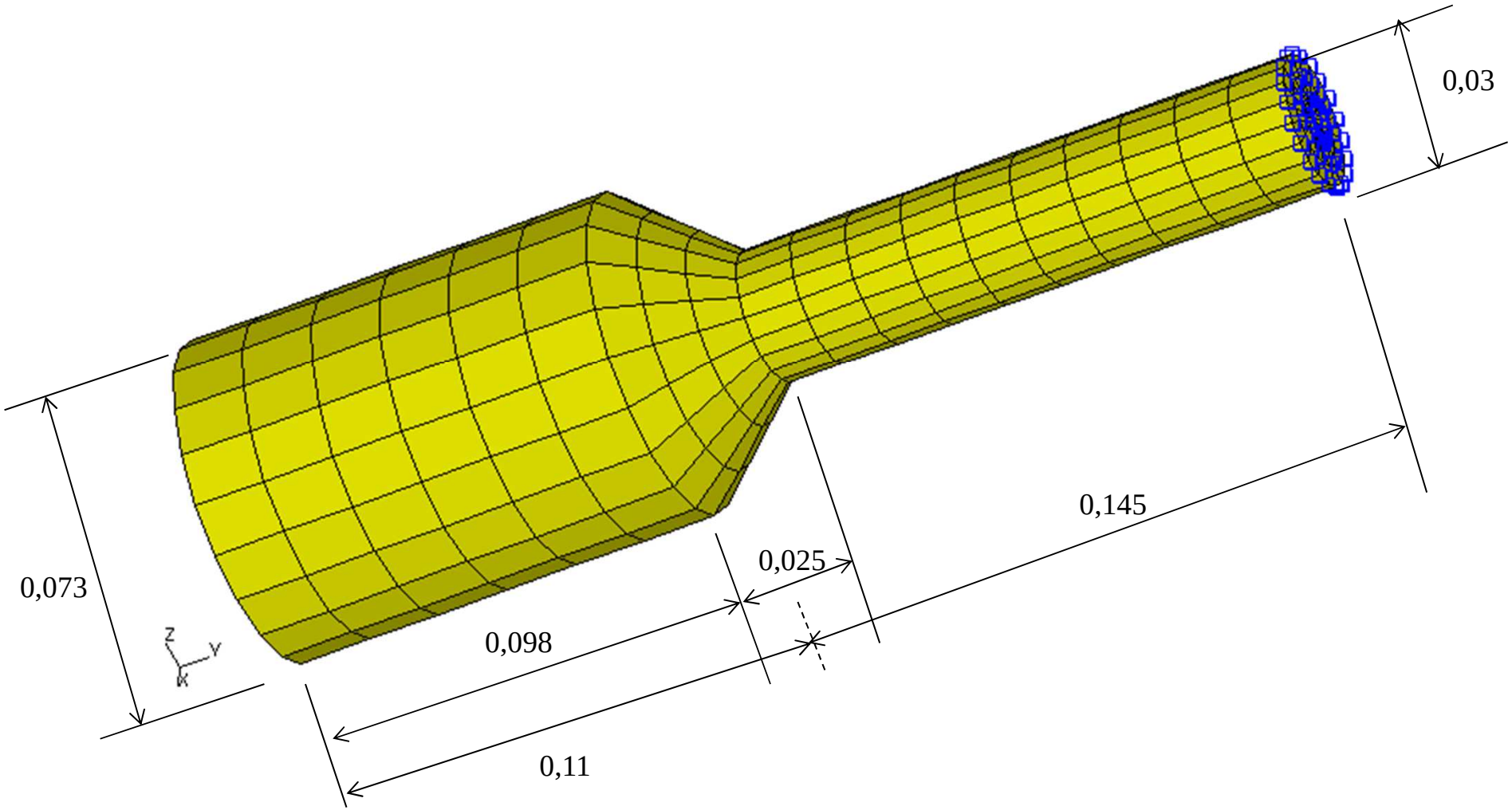
Nyomas rezonancian

Model Mesh [0]
[C]: Pressure at 172.000 Hz (Amplitude)

[N] Pressure (BC)



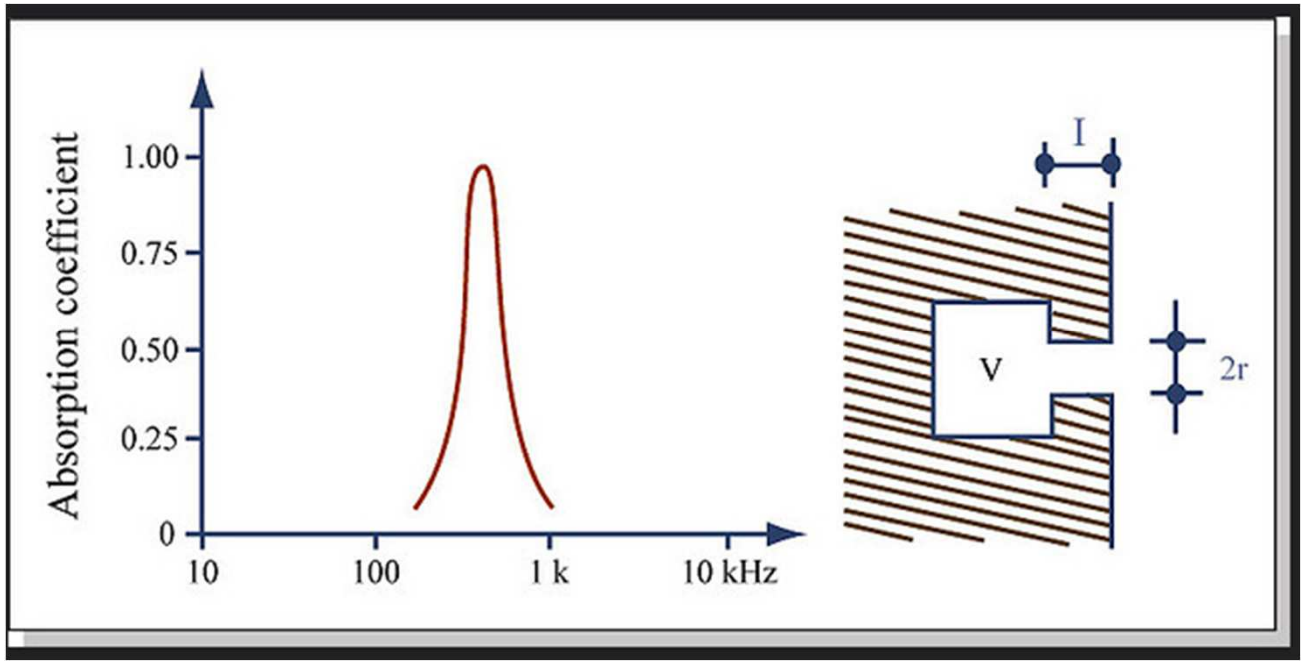

SYSNOISE - COMPUTATIONAL VIBRO-ACOUSTICS
Sebesseg rezonancian
Model Mesh [0]
[C]: Velocity at 172.000 Hz (Amplitude; V Component)
[N] Pressure (BC)
Velocity
1.943E+000
1.702E+000
1.462E+000
1.222E+000
9.812E-001
7.408E-001
5.004E-001
2.600E-001
1.961E-002


0,03
0,073
0,145
0,025
0,098
0,11
Z
Y
X

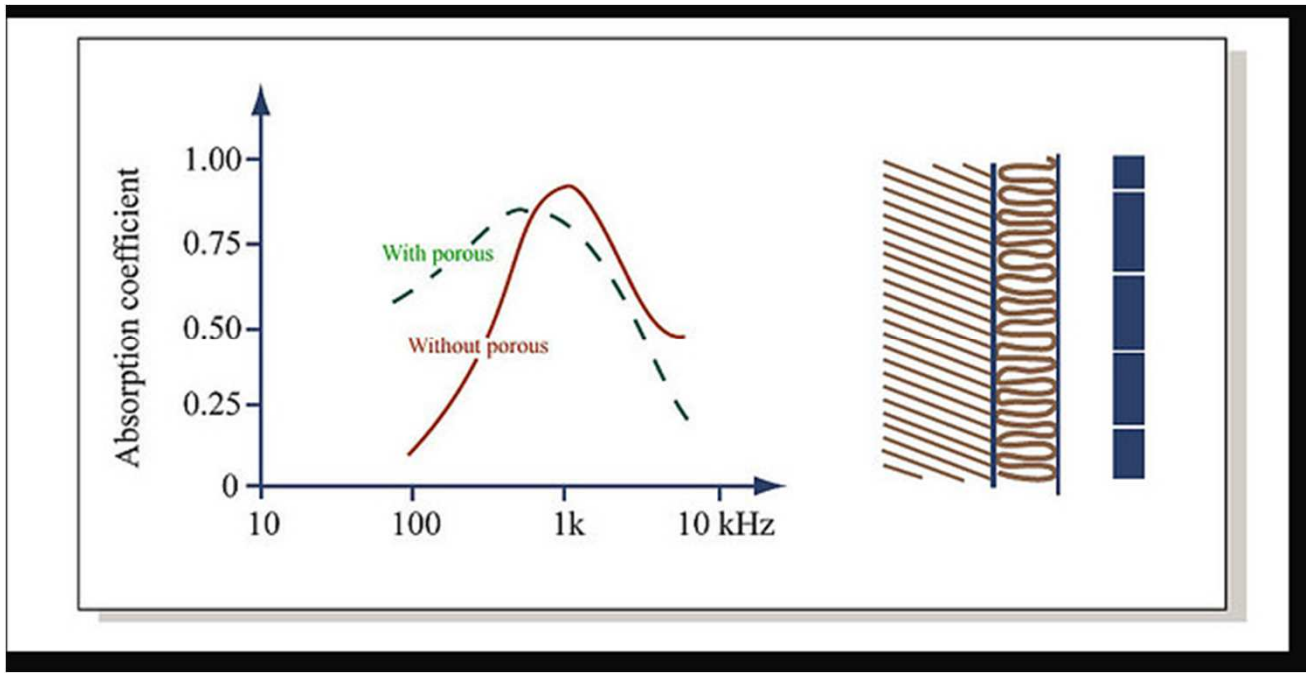
Az eredeti Helmholtz-féle rezonátor

Már a régi görögök is…

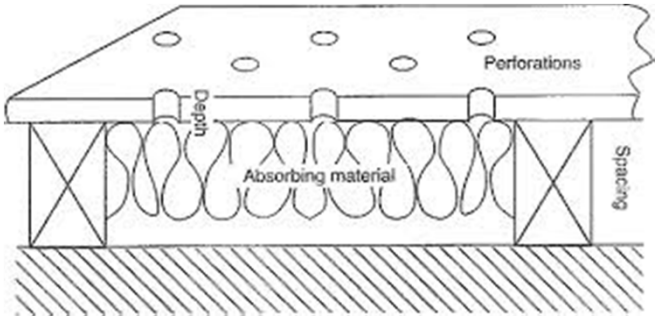
Falüreg mint Helmholtz-rezonátor

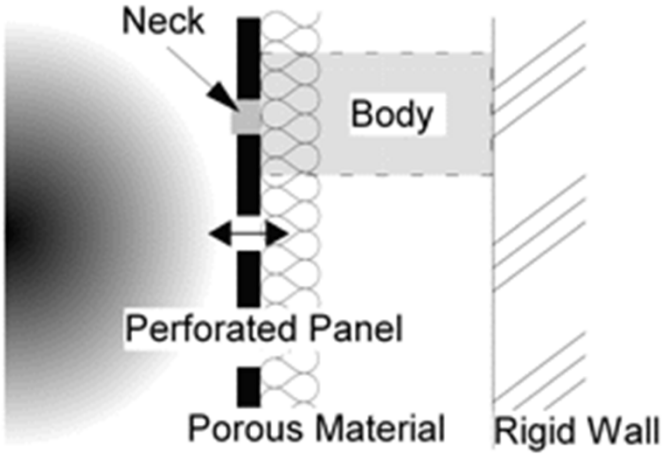


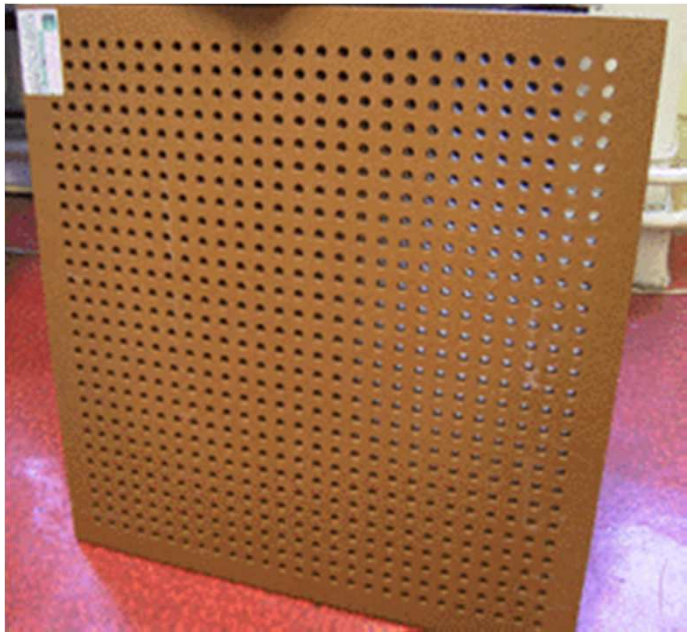
Réselt lemez mint Helmholtz-rezonátorsor

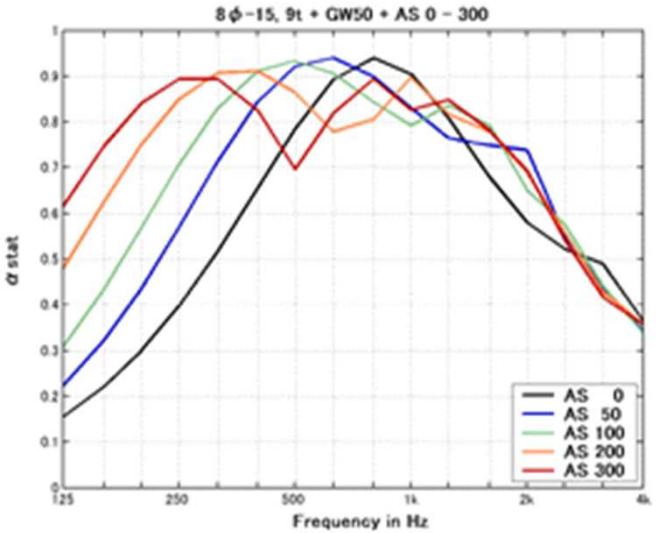


- Gyakorlati alkalmazások

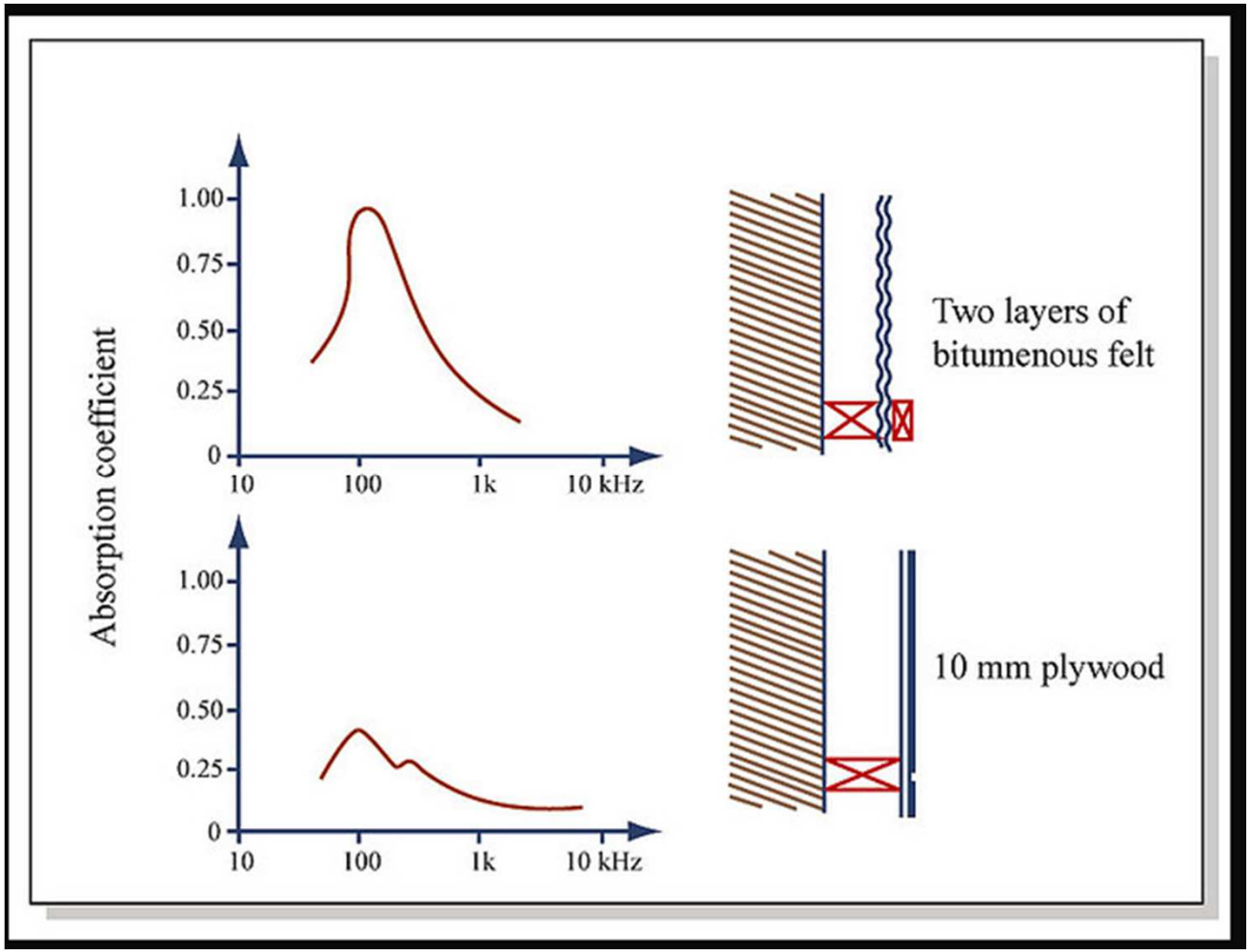




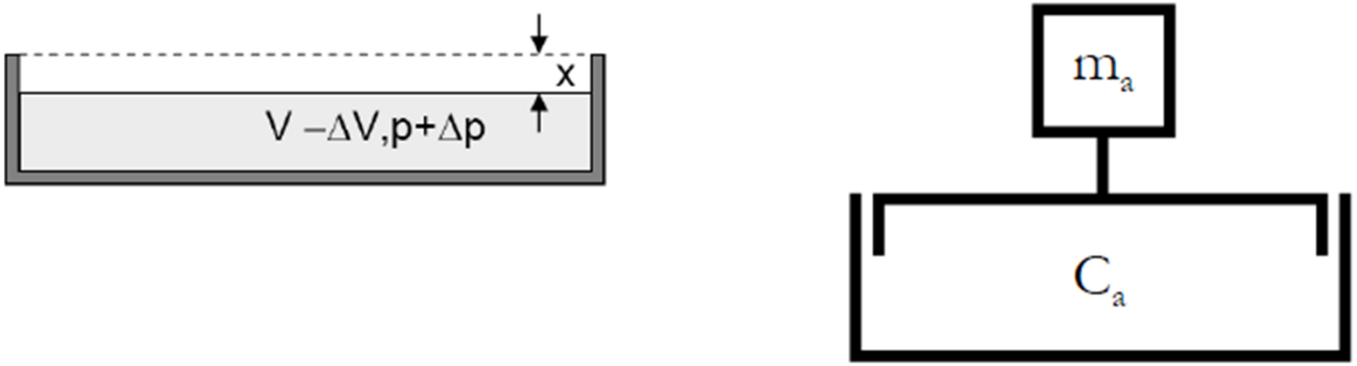




Helmholtz-tól úton a membránrezontor felé



Membránrezonátor működése és méretezése

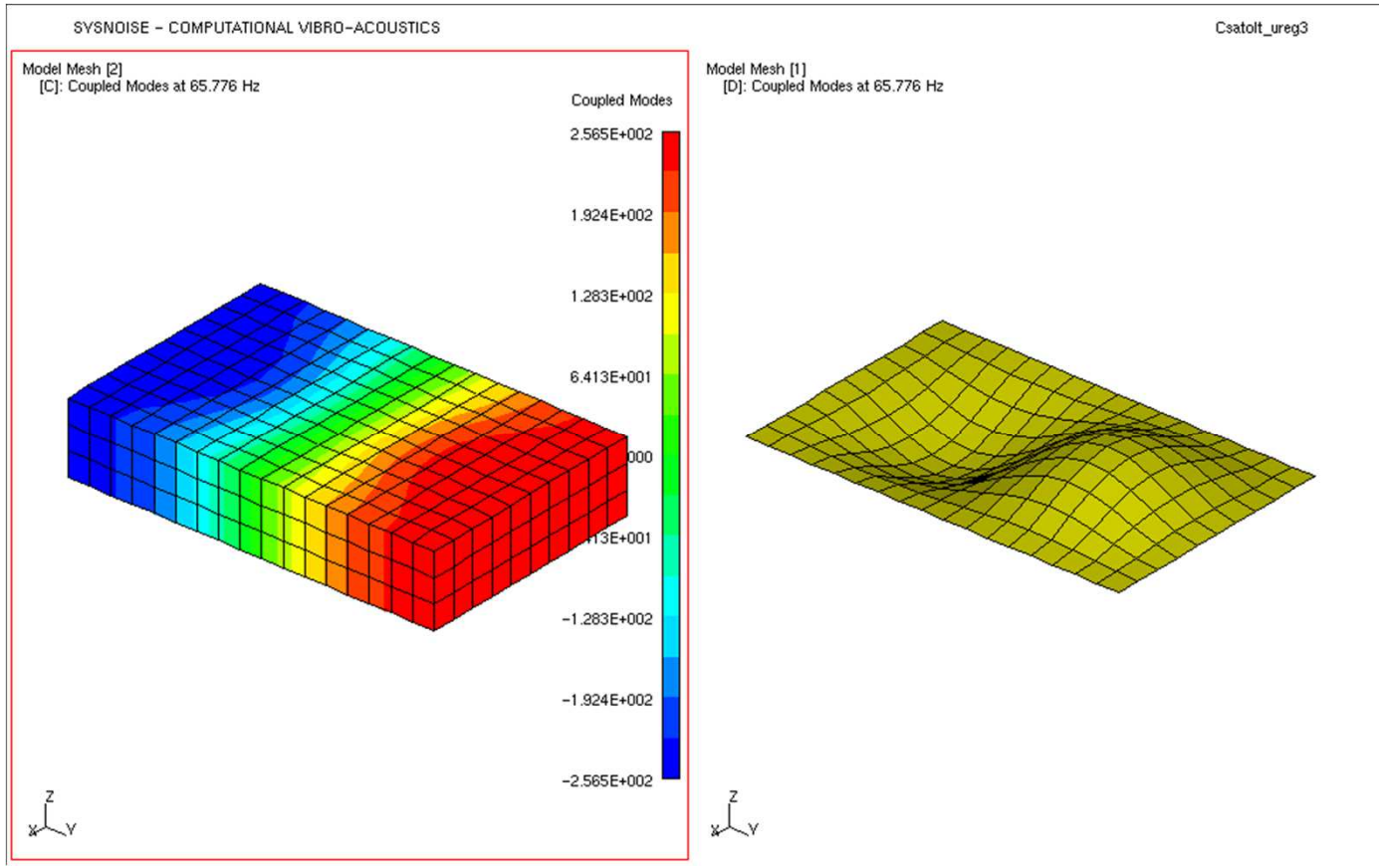


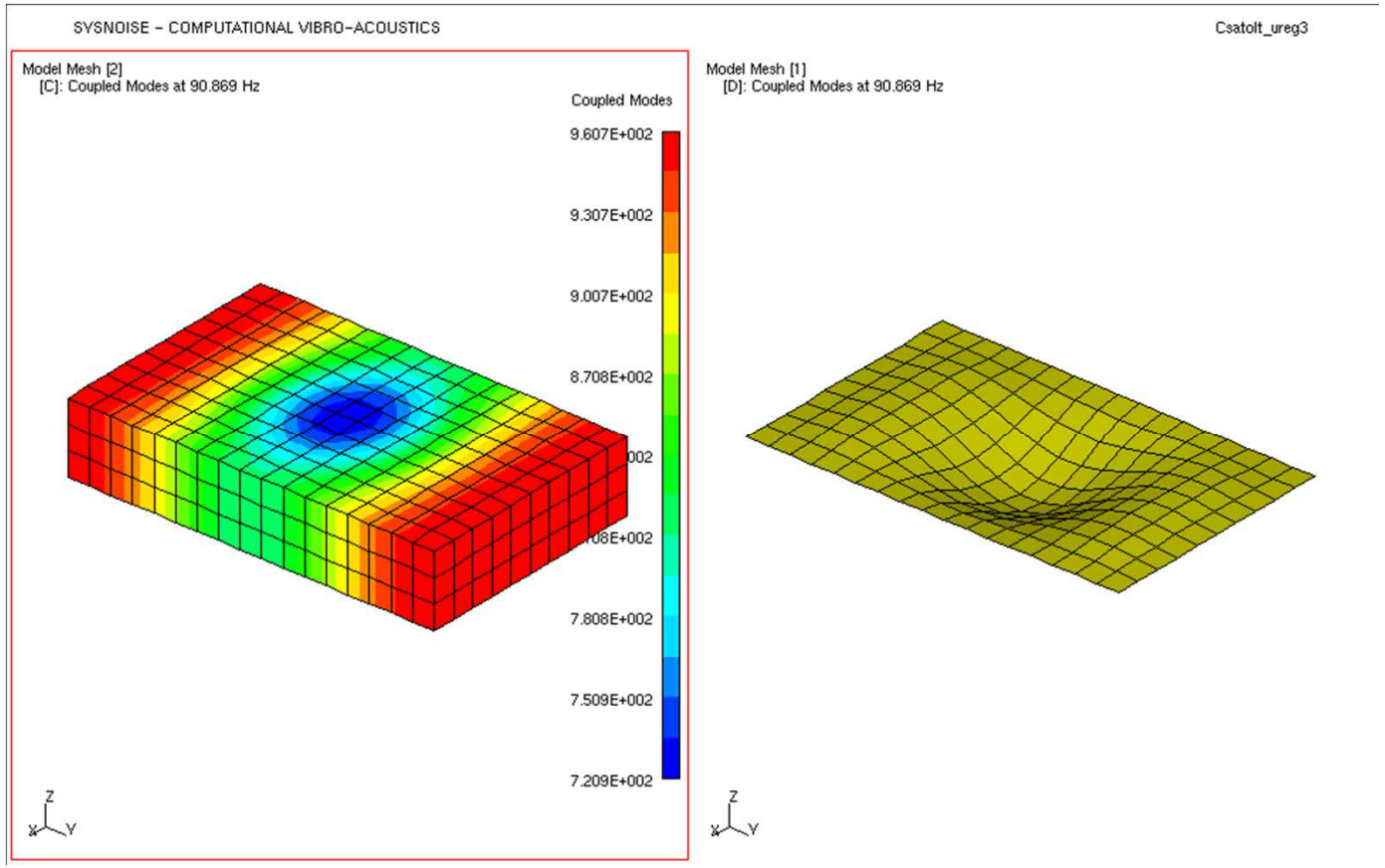
$$f_0 = \frac{1}{2\pi}\sqrt{\frac{1}{C_a \cdot m_a}} = \frac{1}{2\pi}\sqrt{\frac{\kappa \cdot p_{st} \cdot A^2}{V \cdot m}} = \frac{1}{2\pi}\sqrt{\frac{c^2 \cdot \rho_{st}}{\rho_A \cdot t}} = \frac{c \cdot \sqrt{\rho_{st}}}{2\pi} \cdot \sqrt{\frac{1}{\rho_A \cdot t}} \approx 60 \cdot \sqrt{\frac{1}{\rho_A \cdot t}}$$

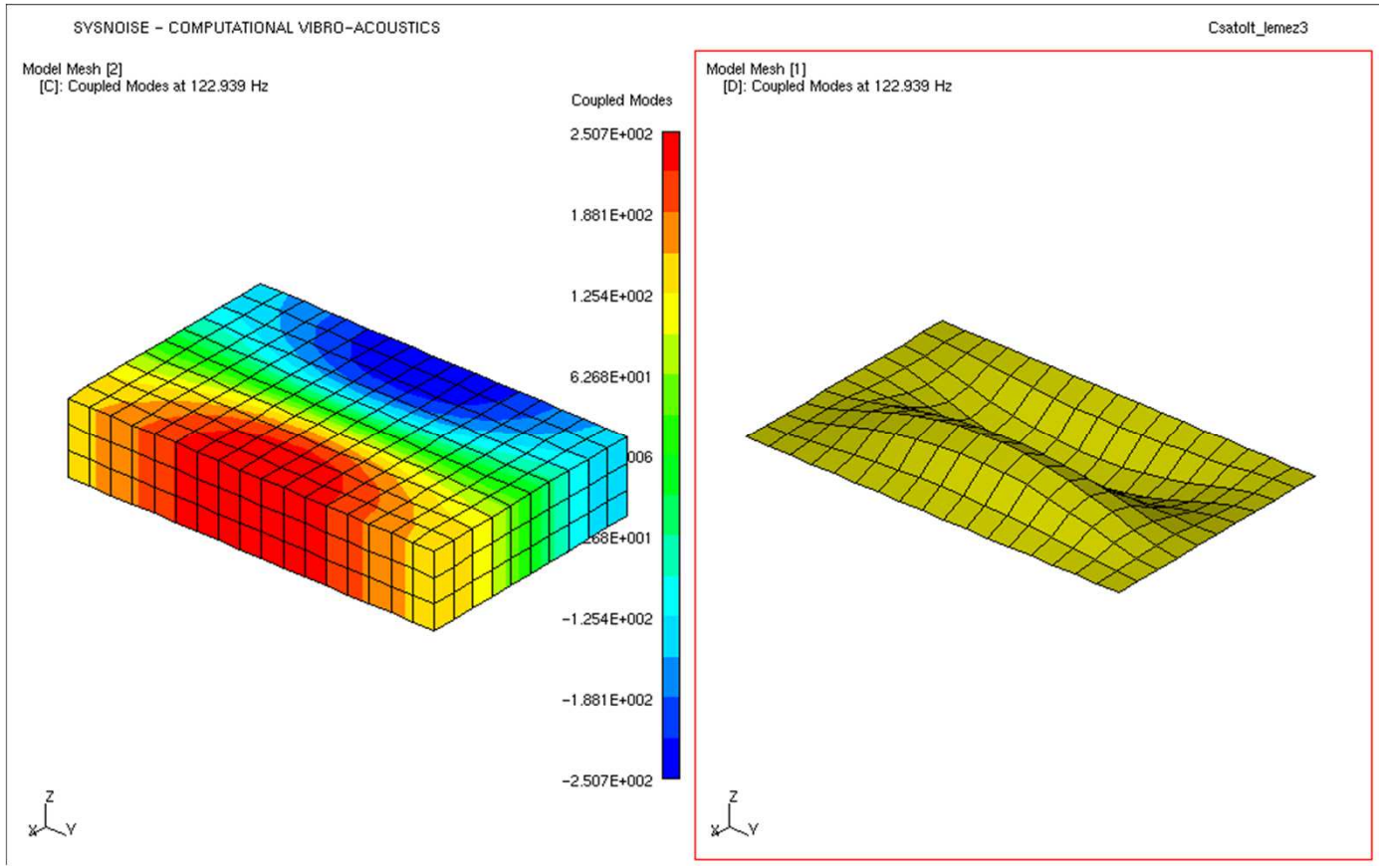
Membránrezonátor összeszerelése

17. ábra: A membránrezonátor összeszerelése

Valóságos működésmód




SYSNOISE - COMPUTATIONAL VIBRO-ACOUSTICS
Csatolt_ureg3
Model Mesh [2]
[C]: Coupled Modes at 90.869 Hz
Coupled Modes
9.607E+002
9.307E+002
9.007E+002
8.708E+002
7.808E+002
7.509E+002
7.209E+002
Z
X
Y
Model Mesh [1]
[D]: Coupled Modes at 90.869 Hz
Z
X
Y


SYSNOISE - COMPUTATIONAL VIBRO-ACOUSTICS
Csatolt_lemez3
Model Mesh [2]
[C]: Coupled Modes at 122.939 Hz
Coupled Modes
2.507E+002
1.881E+002
1.254E+002
6.268E+001
-1.254E+002
-1.881E+002
-2.507E+002
Z
X
Y
Model Mesh [1]
[D]: Coupled Modes at 122.939 Hz
Z
X
Y