IX Računske vežbe

(1) Predajna prostorija je industrijska hala, a prijemna konstrukcioni biro koji se nalazi iznad hale. Nivo buke u proizvodnoj hali je 90 dB. Da li je nivo buke u konstrukcionom birou, dimenzija 10 × 6 × 5 m, sa srednjom vrednošću koeficijenta apsorpcije 0,4 u dozvoljenim granicama, ako je srednja vrednost koeficijenta prenošenja tavanice 0,01? Dozvoljeni nivo buke u konstrukcionom birou iznosi 45 dB. (14. grupa)

$L_1 = 90\,dB$

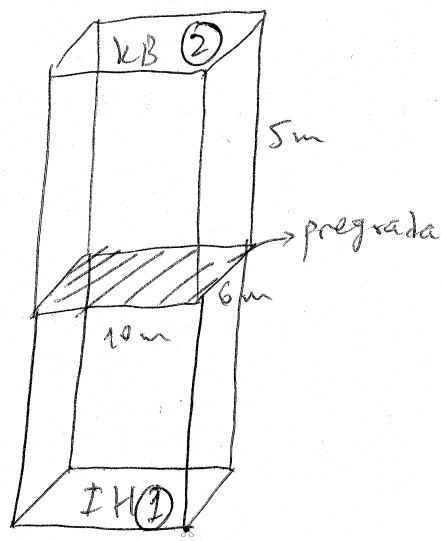
KB: $10 \times 6 \times 5\ m$

$a_2 = 10\ m$, $b_2 = 6\ m$, $c_2 = 5\ m$ $\Big\}$ $V_2 = a_2 b_2 c_2 = 10 \cdot 6 \cdot 5\ m^3 = \boxed{300\ m^3}$

$\bar{\alpha}_2 = 0,4$

$\bar{\tau} = 0,01$ (1%)

$L_{2d} = 45\,dB$



$S_2 = 2(a_2 b_2 + a_2 c_2 + b_2 c_2)$

$S_2 = 2 \cdot (10 \cdot 6 + 10 \cdot 5 + 6 \cdot 5) = 2 \cdot (60 + 50 + 30) = 2 \cdot 140 = \boxed{280\ m^2}$

$\boxed{S_2 = 280\ m^2}$ – površina konstrukcionog biroa

$A_2 = \sum_i S_i \alpha_i = S_2 \bar{\alpha}_2 = 280 \cdot 0,4 = \boxed{112\ m^2}$

$R = 10 \log \left(\frac{P_1}{P_2} \right) = 10 \log \left(\frac{\frac{I_1 S_p}{4}}{\frac{I_2 A_2}{4}} \right) = 10 \log \left(\frac{I_1}{I_2} \cdot \frac{S_p}{A_2} \right) = \underbrace{10 \log \frac{I_1}{I_2}}_{D = L_1 - L_2} + 10 \log \frac{S_p}{A_2}$

$\Rightarrow \boxed{R = D + 10 \log \frac{S_p}{A_2}}$ S_p – površina pregrade

$$D = L_1 - L_2 = R - 10\log\frac{S_p}{A_2} = \boxed{R + 10\log\frac{A_2}{S_p}}$$

$$\boxed{R = 10\log\left(\frac{1}{\tau}\right)}$$

$$R = 10\log\left(\frac{1}{10^{-2}}\right) = 10\log(10^2) = 2\cdot 10\cdot \log 10^1 = \boxed{20\ dB} \qquad \boxed{R = 20\ dB}$$

$$D = R + 10\log\frac{A_2}{S_p}$$

$$S_p = 10\cdot 6 = \boxed{60\ m^2}$$

$$D = R + 10\log\left(\frac{112\ m^2}{60\ m^2}\right) = R + 10\log\left(\frac{56}{30}\right) = R + \underbrace{10\log\left(\frac{28}{15}\right)}_{2,7\ dB}$$

$$\boxed{D = 22,7\ dB}$$

$$D = L_1 - L_2 = R + 10\log\frac{A_2}{S_p}$$

$$L_2 = L_1 - R - 10\log\frac{A_2}{S_p}$$

$$L_2 = 90 - 20 - 10\log\left(\frac{112}{60}\right) = 70 - \underbrace{10\log\left(\frac{28}{15}\right)}_{2,7} = \boxed{67,3\ dB}$$

$$\boxed{L_2 = 67,3\ dB}$$

$$DL = L_2 - L_{2d} = 67,3\ dB - 45\ dB = \boxed{22,3\ dB}$$

$DL = 22,3\ dB$ – prekoračenje v kB

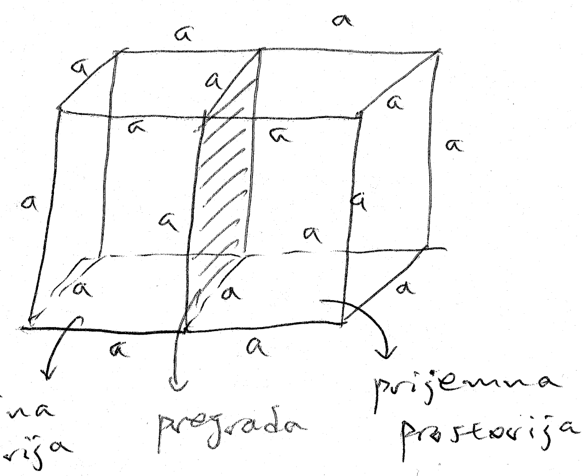
(2.) Dve susedne prostorije oblika kocke, stranice 4m, imaju istu srednju vrednost koeficijenta apsorpcije 0,3. U predajnoj prostoriji smešten je izvor zvuka zvučne snage 10 mW. odrediti:

(a) intenzitet difuznog zvuka u predajnoj prostoriji

(b) intenzitet u prijemnoj prostoriji pri koeficijentu prenošenja pregradnog zida 0,01

(c) intenzitet zvuka u prostoriji ako se ukloni pregradni zid.

(15. knjiga)



$a = 4m$

$\bar{\alpha}_1 = \bar{\alpha}_2 = \bar{\alpha} = 0,3$

$P_a = 10\,mW = 10 \cdot 10^{-3}\,W = 10^{-2}\,W$

$S_1 = S_2 = 6a^2 = 6 \cdot 4^2 = 6 \cdot 16 = \boxed{96\,m^2}$

$A = \sum_i S_i \bar{\alpha}_i = S_1 \bar{\alpha}_1 = 96 \cdot 0,3 = \boxed{28,8\,m^2}$

(a) $I_1 = \frac{4 P_a}{A_1} = \frac{4 \cdot 10^{-2}}{28,8} \frac{W}{m^2} = \boxed{1,39 \cdot 10^{-3} \frac{W}{m^2}}$

$L_1 = 10 \log \frac{I_1}{I_0} = 10 \log \left(\frac{1,39 \cdot 10^{-3} \frac{W}{m^2}}{10^{-12} \frac{W}{m^2}} \right) = 10 \log (1,39 \cdot 10^9) =$

$= 10 \log (1,39) + 10 \log 10^9 = 10 \log (1,39) + 90 = \boxed{91,4\,dB}$

$\boxed{L_1 = 91,4\,dB}$

(b) pregradni zid: $S_p = S_{12} = a \cdot a = a^2 = 16\,m^2$

$\bar{\tau} = 0,01\ (1\%)$

$R = 10 \log \left(\frac{1}{\bar{\tau}} \right) = 10 \log \left(\frac{1}{10^{-2}} \right) = 10 \log (10^2) = 10 \cdot 2 \cdot \log 10 = \boxed{20\,dB}$

$\boxed{R = 20\,dB}$

$A_2 = A_1 = 28{,}8\ m^2$

$D = R + 10\log\frac{A_2}{S_p} = 20 + 10\log\left(\frac{28{,}8\ m^2}{16\ m^2}\right) = 20 + 10\log\left(\frac{28{,}8}{16}\right) =$

$= 20 + \underbrace{10\log(1{,}8)}_{2{,}5} = \boxed{22{,}5\ dB} \Rightarrow \boxed{D = 22{,}5\ dB}$

$D = L_1 - L_2 \Rightarrow L_2 = L_1 - D = (91{,}4 - 22{,}5)\ dB = \boxed{68{,}9\ dB}$

$\boxed{D = 68{,}9\ dB}$

$L_2 = 10\log\frac{I_2}{I_0} \Rightarrow \frac{L_2}{10} = \log\frac{I_2}{I_0} \Rightarrow 10^{\frac{L_2}{10}} = \frac{I_2}{I_0} \Rightarrow \boxed{I_2 = I_0 \cdot 10^{\frac{L_2}{10}}}$

$I_0 = 10^{-12}\ \frac{W}{m^2}$

$I_2 = 10^{-12} \cdot 10^{\frac{68{,}9}{10}}\ \frac{W}{m^2} = 10^{-12} \cdot 10^{6{,}89}\ \frac{W}{m^2} = 10^{-12+6{,}89}\ \frac{W}{m^2} = 10^{-5{,}11}\ \frac{W}{m^2}$

$\Rightarrow \boxed{I_2 = 7{,}76 \cdot 10^{-6}\ \frac{W}{m^2}}$

(c) $S = 2\cdot(2a\cdot a + 2a\cdot a + a\cdot a) = 2\cdot(2a^2 + 2a^2 + a^2) = 2\cdot 5a^2 = 10a^2$

$S = 12a^2 - 2a^2 = 10a^2 \Rightarrow S = 10\cdot 4^2 = 10\cdot 16 = \boxed{160\ m^2}$

$\boxed{S = 160\ m^2}$ - površina kada se ukloni pregradni zid između prednje i prijemne prostorije

$A = \sum_i S_i \bar{\alpha}_i = S\bar{\alpha} = 160\cdot 0{,}3\ m^2 = \boxed{48\ m^2}$

$I = \frac{4P_a}{A} = \frac{4\cdot 10^{-2}\ W}{48\ m^2} = \frac{1}{12}\cdot 10^{-2}\ \frac{W}{m^2} = \boxed{8{,}3\cdot 10^{-4}\ \frac{W}{m^2}}$

$L = 10\log\frac{I}{I_0} = 10\log\left(\frac{8{,}3\cdot 10^{-4}\ \frac{W}{m^2}}{10^{-12}\ \frac{W}{m^2}}\right) = 10\log(8{,}3\cdot 10^8) =$

$= 10\log(8{,}3) + 10\log(10^8) = 10\log(8{,}3) + 10\cdot 8\cdot \log 10^1 =$

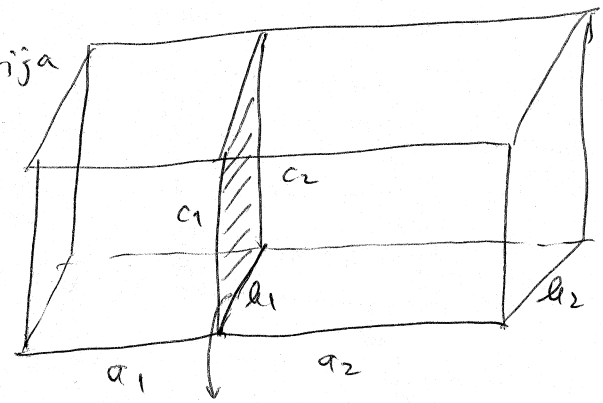
$= 80 + 10\log(8{,}3) = \boxed{89{,}2\ dB}$

$\Rightarrow \boxed{L = 89{,}2\ dB}$

(3.) Odrediti zvučnu snagu izvora i intenzitet zvuka u prostoriji dimenzija 10 x 8 x 5 m i srednje vrednosti koeficijenta refleksije zvuka 0,7999, koja je od prijemne prostorije odvojena pregradnim zidom ukupne zvučne izolacije 47,78 dB. U prijemnoj prostoriji dimenzija 20 x 8 x 5 m i srednje vrednosti koeficijenta apsorpcije zvuka 0,4, izmeren je intenzitet zvuka 0,4 $\frac{mW}{m^2}$. (16. knjiga)

predajna prostorija:
- $a_1 = 10\,m$
- $b_1 = 8\,m$
- $c_1 = 5\,m$
- $\overline{r_1} = 0,7999$

$D = 47,78\,dB$



prijemna prostorija:
- $a_2 = 20\,m$
- $b_2 = 8\,m$
- $c_2 = 5\,m$
- $\overline{\alpha_2} = 0,4$
- $I_2 = 0,4\ \frac{mW}{m^2}$

$S_1 = 2(a_1b_1 + a_1c_1 + b_1c_1) = 2\cdot(10\cdot 8 + 10\cdot 5 + 8\cdot 5) = 2\cdot(80+50+40)$

$S_1 = 2\cdot 170 = \boxed{340\,m^2} \Rightarrow \boxed{S_1 = 340\,m^2}$

$S_2 = 2\cdot(a_2b_2 + a_2c_2 + b_2c_2) = 2\cdot(20\cdot 8 + 20\cdot 5 + 8\cdot 5) = 2\cdot(160+100+40)$

$S_2 = 2\cdot 300 = \boxed{600\,m^2} \Rightarrow \boxed{S_2 = 600\,m^2}$

$A_2 = \sum_i S_i\overline{\alpha_i} = S_2\overline{\alpha_2} = 600\cdot 0,4\,m^2 = \boxed{240\,m^2}$

$S_p = S_{12} = 8\cdot 5 = \boxed{40\,m^2}$

$$D = R + 10\log\frac{A_2}{S_p}$$

$$R = D - 10\log\frac{A_2}{S_p} = 47{,}78 - 10\log\left(\frac{24\pi}{4\pi}\right) = 47{,}78 - \underbrace{10\log 6}_{7{,}78} = \boxed{40\,dB}$$

$$\Rightarrow \boxed{R = 40\,dB}$$

$$R = 10\log\left(\frac{1}{\bar{\tau}}\right) \Rightarrow \frac{R}{10} = \log\left(\frac{1}{\bar{\tau}}\right)$$

$$10^{\frac{R}{10}} = \frac{1}{\bar{\tau}} \Rightarrow \bar{\tau} = \frac{1}{10^{\frac{R}{10}}} \Rightarrow \boxed{\bar{\tau} = 10^{-\frac{R}{10}}}$$

$$\bar{\tau} = 10^{-\frac{40}{10}} = 10^{-4} = 0{,}0001$$

$$I_2 = \frac{4P_2}{A_2} \Rightarrow \boxed{P_2 = \frac{A_2 I_2}{4}}$$

$$P_2 = \frac{\overset{60}{\cancel{240}}\,\cancel{m^2} \cdot 0{,}4 \cdot 10^{-3}\,\frac{W}{\cancel{m^2}}}{\cancel{4}} = 60 \cdot 0{,}4 \cdot 10^{-3}\,W = \boxed{24 \cdot 10^{-3}\,W}$$

$$\boxed{P_2 = 0{,}024\,W}$$

$$\boxed{P_2 = 24\,mW}$$

$$\bar{\tau} = \frac{P_2}{P_1} \Rightarrow P_1 = \frac{P_2}{\bar{\tau}} = \frac{24 \cdot 10^{-3}\,W}{10^{-4}} = 24 \cdot 10\,W \Rightarrow \boxed{P_1 = 240\,W}$$

$$P_1 = \frac{I_1 S_p}{4} \Rightarrow I_1 = \frac{4P_1}{S_p} = \frac{4 \cdot 240\,W}{40\,m^2} = \boxed{24\,\frac{W}{m^2}}$$

$$\bar{\alpha}_1 + \bar{r}_1 + \bar{\tau} = 1$$

$$\bar{\alpha}_1 = 1 - \bar{r}_1 - \bar{\tau} = 1 - 0{,}0001 - 0{,}7999 = 1 - 0{,}8 = \boxed{0{,}2} \Rightarrow \boxed{\bar{\alpha}_1 = 0{,}2}$$

$$\boxed{S_1 = 340\,m^2}$$

$$A_1 = \sum_i S_i \bar{\alpha}_i = S_1 \bar{\alpha}_1 = 340 \cdot 0{,}2\,m^2 = \boxed{68\,m^2}$$

$$I_1 = \frac{4P_a}{A_1} \Rightarrow P_a = \frac{I_1 A_1}{4} = \frac{24\,\frac{W}{\cancel{m^2}} \cdot 68\,\cancel{m^2}}{4} = \frac{\overset{6}{\cancel{24}} \cdot 68}{\cancel{4}_1}\,W = 6 \cdot 68\,W$$

$$\Rightarrow \boxed{P_a = 408\,W}$$

(4.) Izvor zvuka se nalazi u proizvodnoj hali dimenzija 10×8×4 m i srednje vrednosti koeficijenta refleksije 0,6. Hala je od kancelarijskog prostora, dimenzija 8×4×4 m i srednje vrednosti koeficijenta apsorpcije 0,5, odvojena pregradnim zidom koji obezbeđuje ukupnu zvučnu izolaciju prostorija od 40 dB. Izračunati zvučnu snagu izvora zvuka ako je nivo zvuka u kancelarijskom prostoru 70 dB. (17. vežba)

$a_1 = 10\,m$
$b_1 = 8\,m$
$c_1 = 4\,m$
$\bar{r}_1 = 0,6$
} proizvodna hala

$a_2 = 8\,m$
$b_2 = 4\,m$
$c_2 = 4\,m$
$\bar{\alpha}_2 = 0,5$
} kancelarija

$D = 40\,dB$
$L_2 = 70\,dB$
$P_a = ?$

$D = L_1 - L_2 \Rightarrow L_1 = L_2 + D = 70\,dB + 40\,dB = \boxed{110\,dB}$

$\boxed{L_1 = 110\,dB}$

$L_1 = 10 \log \frac{I_1}{I_0} \Rightarrow \frac{L_1}{10} = \log \frac{I_1}{I_0} \Rightarrow 10^{\frac{L_1}{10}} = \frac{I_1}{I_0} \Rightarrow \boxed{I_1 = I_0 \cdot 10^{\frac{L_1}{10}}}$

$I_0 = 10^{-12} \frac{W}{m^2}$

$I_1 = 10^{-12} \frac{W}{m^2} \cdot 10^{\frac{110}{10}} = 10^{-12} \cdot 10^{11} \frac{W}{m^2} = 10^{-1} \frac{W}{m^2} = \boxed{0,1 \frac{W}{m^2}}$

$\boxed{I_1 = 0,1 \frac{W}{m^2}}$

$S_1 = 2(a_1 b_1 + a_1 c_1 + b_1 c_1) = 2 \cdot (10 \cdot 8 + 10 \cdot 4 + 8 \cdot 4) = 2 \cdot (80 + 40 + 32)$

$S_1 = 2 \cdot 152 = \boxed{304\,m^2} \Rightarrow \boxed{S_1 = 304\,m^2}$

$S_2 = 2(a_2 \cdot b_2 + a_2 c_2 + b_2 c_2) = 2 \cdot (8 \cdot 4 + 8 \cdot 4 + 4 \cdot 4) = 2 \cdot (32 + 32 + 16) =$

$= 2 \cdot 16 \cdot 5 = 2 \cdot 80 = \boxed{160\,m^2} \Rightarrow \boxed{S_2 = 160\,m^2}$

$A_2 = \sum_i S_i \bar{\alpha}_i = S_2 \bar{\alpha}_2 = 160 \cdot 0,5 = \boxed{80\ m^2}$

$S_p = S_{12} = 8 \cdot 4 = \boxed{32\ m^2}$

$R = D - 10 \log \frac{A_2}{S_{12}} = 40 - 10 \log\left(\frac{80}{32}\right) = 40 - \underbrace{10 \log\left(\frac{5}{2}\right)}_{4} = \boxed{36\ dB}$

$\boxed{R = 36\ dB}$

$R = 10 \log\left(\frac{1}{\bar{\tau}}\right) \Rightarrow \frac{R}{10} = \log\left(\frac{1}{\bar{\tau}}\right) \Rightarrow 10^{\frac{R}{10}} = \frac{1}{\bar{\tau}} \Rightarrow \boxed{\bar{\tau} = 10^{-\frac{R}{10}}}$

$\bar{\tau} = 10^{-\frac{36}{10}} = 10^{-3,6} \Rightarrow \boxed{\bar{\tau} = 2,5 \cdot 10^{-4}}$

$\bar{\alpha}_1 + \bar{r}_1 + \bar{\tau} = 1$

$\bar{\alpha}_1 = 1 - \bar{r}_1 - \bar{\tau} = 1 - 0,00025 - 0,6 = 0,4 - 0,00025 = \boxed{0,39975}$

$\Rightarrow \boxed{\bar{\alpha}_1 = 0,39975}$

$\boxed{S_1 = 304\ m^2}$

$A_1 = \sum_i S_i \bar{\alpha}_i = S_1 \bar{\alpha}_1 = 304 \cdot 0,39975 = \boxed{121,5\ m^2}$

$I_1 = \frac{4P_a}{A_1} \Rightarrow P_a = \frac{I_1 A_1}{4} = \frac{0,1\ \frac{W}{m^2} \cdot 121,5\ m^2}{4} = \frac{0,1 \cdot 121,5}{4} W$

$P_a = \frac{12,15}{4} W \Rightarrow \boxed{P_a = 3,04\ W}$

(5.) Pregrada ukupne površine $28\,m^2$ sačinjena od zida izolacione moći 48 dB i vrata površine $2\,m^2$, čija je izolaciona moć 25 dB. Ako se na pregradu poseavi i prozor površine $8\,m^2$, izračunati potrebnu izolacionu moć prozora nako se izolaciona moć pregrade ne bi pogoršala za više od 1 dB. (18. knjiga)

$S_{12} = 28\,m^2$ - površina pregrade

$R_z = 48$ dB - izolaciona moć zida

$S_v = 2\,m^2$ - površina vrata

$R_v = 25$ dB - izolaciona moć vrata

$S_p = 8\,m^2$ - površina prozora

$R_p = ?$ - izolaciona moć prozora

$S_{12} = S_z + S_v$ (zid + vrata)

$S_z = S_{12} - S_v = 28 - 2 = \boxed{26\,m^2}$ - površina zida

$S_{12} \cdot \bar{\tau}_u = S_z \cdot \bar{\tau}_z + S_v \cdot \bar{\tau}_v$ (*)

$R_z = 10 \log\left(\frac{1}{\bar{\tau}_z}\right) \Rightarrow \frac{R_z}{10} = \log\left(\frac{1}{\bar{\tau}_z}\right) \Rightarrow 10^{\frac{R_z}{10}} = \frac{1}{\bar{\tau}_z}$

$$\boxed{\bar{\tau}_z = 10^{-\frac{R_z}{10}}}$$

$R_v = 10 \log\left(\frac{1}{\bar{\tau}_v}\right) \Rightarrow \frac{R_v}{10} = \log\left(\frac{1}{\bar{\tau}_v}\right) \Rightarrow 10^{\frac{R_v}{10}} = \frac{1}{\bar{\tau}_v}$

$$\boxed{\bar{\tau}_v = 10^{-\frac{R_v}{10}}}$$

$R_p = 10 \log\left(\frac{1}{\bar{\tau}_p}\right) \Rightarrow \frac{R_p}{10} = \log\left(\frac{1}{\bar{\tau}_p}\right) \Rightarrow 10^{\frac{R_p}{10}} = \frac{1}{\bar{\tau}_p}$

$$\boxed{\bar{\tau}_p = 10^{-\frac{R_p}{10}}}$$

$$(*) \Rightarrow \bar{\tau}_u = \frac{S_z \bar{\tau}_z + S_v \bar{\tau}_v}{S_{12}} = \boxed{\frac{S_z \cdot 10^{-\frac{R_z}{10}} + S_v \cdot 10^{-\frac{R_v}{10}}}{S_{12}}}$$

$$R_u = 10 \log\left(\frac{1}{\bar{\tau}_u}\right) = 10 \log\left(\frac{1}{\frac{S_z}{S_{12}} \cdot 10^{-\frac{R_z}{10}} + \frac{S_v}{S_{12}} \cdot 10^{-\frac{R_v}{10}}}\right)$$

$$\boxed{R_u = 10 \log\left(\frac{S_{12}}{S_z \cdot 10^{-\frac{R_z}{10}} + S_v \cdot 10^{-\frac{R_v}{10}}}\right)}$$

$$R_u = 10 \log\left(\frac{28}{26 \cdot 10^{-\frac{48}{10}} + 2 \cdot 10^{-\frac{25}{10}}}\right) = 10 \log\left(\frac{14}{13 \cdot 10^{-4,8} + 10^{-2,5}}\right)$$

$$\boxed{R_u = 36,2 \text{ dB}}$$

$$R_u' = R_u - 1 \Rightarrow \boxed{R_u' = 35,2 \text{ dB}}$$

S_z' - površina zida nakon postavljanja prozora

$$S_z' = S_{12} - S_v - S_p = 28 - 2 - 8 = \boxed{18 \text{ m}^2}$$

$$\bar{\tau}_u' = \frac{S_z' \bar{\tau}_z + S_v \bar{\tau}_v + S_p \bar{\tau}_p}{S_{12}} = \boxed{\frac{S_z' \cdot 10^{-\frac{R_z}{10}} + S_v \cdot 10^{-\frac{R_v}{10}} + S_p \cdot 10^{-\frac{R_p}{10}}}{S_{12}}}$$

$$R_u' = 10 \log\left(\frac{1}{\bar{\tau}_u'}\right) = 10 \log\left(\frac{1}{\frac{S_z'}{S_{12}} \cdot 10^{-\frac{R_z}{10}} + \frac{S_v}{S_{12}} \cdot 10^{-\frac{R_v}{10}} + \frac{S_p}{S_{12}} \cdot 10^{-\frac{R_p}{10}}}\right)$$

$$\frac{R_u'}{10} = \log \frac{S_{12}}{S_z' \cdot 10^{-\frac{R_z}{10}} + S_v \cdot 10^{-\frac{R_v}{10}} + S_p \cdot 10^{-\frac{R_p}{10}}}$$

$$10^{\frac{R_u'}{10}} = \frac{S_{12}}{S_z' \cdot 10^{-\frac{R_z}{10}} + S_v \cdot 10^{-\frac{R_v}{10}} + S_p \cdot 10^{-\frac{R_p}{10}}}$$

$$S_z' \cdot 10^{-\frac{R_z}{10}} + S_v \cdot 10^{-\frac{R_v}{10}} + S_p \cdot 10^{-\frac{R_p}{10}} = S_{12} \cdot 10^{-\frac{R_u'}{10}} \quad / : S_p$$

$$S_p \cdot 10^{-\frac{R_p}{10}} = S_{12} \cdot 10^{-\frac{R_{12}'}{10}} - S_2' \cdot 10^{-\frac{R_{12}}{10}} - S_v \cdot 10^{-\frac{R_v}{10}} \quad / : S_p$$

$$10^{-\frac{R_p}{10}} = \frac{1}{S_p}\left[S_{12} \cdot 10^{-\frac{R_{12}'}{10}} - S_2' \cdot 10^{-\frac{R_2}{10}} - S_v \cdot 10^{-\frac{R_v}{10}}\right] \quad / \log_{10}$$

$$-\frac{R_p}{10} = \log_{10}\left[\frac{1}{S_p}\left(S_{12} \cdot 10^{-\frac{R_{12}'}{10}} - S_2' \cdot 10^{-\frac{R_2}{10}} - S_v \cdot 10^{-\frac{R_v}{10}}\right)\right] \quad / \cdot (-10)$$

$$\boxed{R_p = 10 \log\left[\frac{S_p}{S_{12} \cdot 10^{-\frac{R_{12}'}{10}} - S_2' \cdot 10^{-\frac{R_2}{10}} - S_v \cdot 10^{-\frac{R_v}{10}}}\right]}$$

$$R_p = 10 \log\left(\frac{8}{28 \cdot 10^{-\frac{35,2}{10}} - 18 \cdot 10^{-\frac{48}{10}} - 2 \cdot 10^{-\frac{25}{10}}}\right)$$

$$R_p = 10 \log\left(\frac{4}{14 \cdot 10^{-3,52} - 9 \cdot 10^{-4,8} - 10^{-2,5}}\right) = \boxed{36,428}$$

$\boxed{R_p = 36,4\ dB}$ izolaciona moć prozora