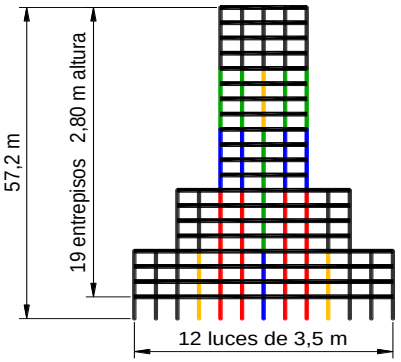
Datos del modelo simplificado, calculo de rigideces, masas y coeficiente de amortiguamiento por piso

Amortiguamiento de Rayleigh

ξ_1	ξ_2	f_1, Hz	f_2, Hz	a_0, Hz	a_1, s
2,50%	2,50%	0,20	2,00	0,0571	0,00362

Sección	b, cm	h, cm	I, cm^4	EI, kN·m^2	ID color
60×60	60,00	60,00	1.080.000,0	253.800	
70×70	70,00	70,00	2.000.833,3	470.196	
80×80	80,00	80,00	3.413.333,3	802.133	
90×90	90,00	90,00	5.467.500,0	1.284.863	
100×100	100,00	100,00	8.333.333,3	1.958.333	

E_c, GPa: 23,50 m_λ, ton/m: 6,20



Piso	H, m	L, m	60×60	70×70	80×80	90×90	100×100	k_{piso}, MN/m	m_{piso}, ton
01	4,00	42,00	6	2	0	1	4	2.171,51	260,40
02	2,80	42,00	6	2	0	1	4	6.330,93	260,40
03	2,80	42,00	6	2	0	1	4	6.330,93	260,40
04	2,80	42,00	6	2	0	1	4	6.330,93	260,40
05	2,80	28,00	4	0	1	0	4	5.275,51	173,60
06	2,80	28,00	4	0	1	0	4	5.275,51	173,60
07	2,80	28,00	4	0	1	0	4	5.275,51	173,60
08	2,80	28,00	4	0	1	0	4	5.275,51	173,60
09	2,80	14,00	0	0	1	4	0	3.247,95	86,80
10	2,80	14,00	0	0	1	4	0	3.247,95	86,80
11	2,80	14,00	0	0	1	4	0	3.247,95	86,80
12	2,80	14,00	0	0	1	4	0	3.247,95	86,80
13	2,80	14,00	0	1	4	0	0	2.010,97	86,80
14	2,80	14,00	0	1	4	0	0	2.010,97	86,80
15	2,80	14,00	0	1	4	0	0	2.010,97	86,80
16	2,80	14,00	0	1	4	0	0	2.010,97	86,80
17	2,80	14,00	5	0	0	0	0	693,70	86,80
18	2,80	14,00	5	0	0	0	0	693,70	86,80
19	2,80	14,00	5	0	0	0	0	693,70	86,80
20	2,80	14,00	5	0	0	0	0	693,70	86,80

Matriz de rigidez [K] del modelo simplificado, MN/m

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
01	8.502,44	-6.330,93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	-6.330,93	12.661,86	-6.330,93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03	0	-6.330,93	12.661,86	-6.330,93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	-6.330,93	11.606,44	-5.275,51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	0	0	0	-5.275,51	10.551,02	-5.275,51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06	0	0	0	0	-5.275,51	10.551,02	-5.275,51	0	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	-5.275,51	10.551,02	-5.275,51	0	0	0	0	0	0	0	0	0	0	0	0
08	0	0	0	0	0	0	-5.275,51	8.523,46	-3.247,95	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	-3.247,95	6.495,90	-3.247,95	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	-3.247,95	6.495,90	-3.247,95	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	-3.247,95	6.495,90	-3.247,95	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	-3.247,95	5.258,92	-2.010,97	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	-2.010,97	4.021,94	-2.010,97	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	-2.010,97	4.021,94	-2.010,97	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	-2.010,97	4.021,94	-2.010,97	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2.010,97	2.704,67	-693,70	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-693,70	1.387,40	-693,70	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-693,70	1.387,40	-693,70	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-693,70	1.387,40	-693,70
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-693,70	693,70

$\times$

$[u]$

$$\begin{bmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \\ u_7 \\ u_8 \\ u_9 \\ u_{10} \\ u_{11} \\ u_{12} \\ u_{13} \\ u_{14} \\ u_{15} \\ u_{16} \\ u_{17} \\ u_{18} \\ u_{19} \\ u_{20} \end{bmatrix}$$

Matriz de coeficientes de amortiguamiento [C], Gg/s

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
01	30,794	-22,918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	-22,918	45,851	-22,918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03	0	-22,918	45,851	-22,918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	-22,918	42,030	-19,097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	0	0	0	-19,097	38,205	-19,097	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06	0	0	0	0	-19,097	38,205	-19,097	0	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	-19,097	38,205	-19,097	0	0	0	0	0	0	0	0	0	0	0	0
08	0	0	0	0	0	0	-19,097	30,865	-11,758	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	-11,758	23,520	-11,758	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	-11,758	23,520	-11,758	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	-11,758	23,520	-11,758	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	-11,758	19,042	-7,280	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	-7,280	14,564	-7,280	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	-7,280	14,564	-7,280	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	-7,280	14,564	-7,280	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-7,280	9,796	-2,511	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,511	5,027	-2,511	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,511	5,027	-2,511	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,511	5,027	-2,511
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,511	2,516

Matriz de masa [M] , toneladas

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
01	260,40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	0	260,40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03	0	0	260,40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0	260,40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	0	0	0	0	173,60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06	0	0	0	0	0	173,60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	0	173,60	0	0	0	0	0	0	0	0	0	0	0	0	0
08	0	0	0	0	0	0	0	173,60	0	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86,80

$\times$

$[\ddot{u}]$

$$\begin{bmatrix} \ddot{u}_1 \\ \ddot{u}_2 \\ \ddot{u}_3 \\ \ddot{u}_4 \\ \ddot{u}_5 \\ \ddot{u}_6 \\ \ddot{u}_7 \\ \ddot{u}_8 \\ \ddot{u}_9 \\ \ddot{u}_{10} \\ \ddot{u}_{11} \\ \ddot{u}_{12} \\ \ddot{u}_{13} \\ \ddot{u}_{14} \\ \ddot{u}_{15} \\ \ddot{u}_{16} \\ \ddot{u}_{17} \\ \ddot{u}_{18} \\ \ddot{u}_{19} \\ \ddot{u}_{20} \end{bmatrix}$$

$$[Z] = [A][Z] + [B]$$

Matriz [A] dividida: Matriz de ceros [0] (Superior izquierda) - Matriz Identidad [I] (Superior derecha) - Matriz [$M^{-1}K$] (Inferior izquierda) - Matriz [$M^{-1}C$] (Inferior derecha)

$$\begin{bmatrix} Z'_1 \\ \hline Z'_2 \end{bmatrix} = \left[\begin{array}{cccccccccccccccccccc|cccccccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1,00 \\ \hline -32,65 & 24,31 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0,1183 & 0,0880 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 24,31 & -48,62 & 24,31 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,0880 & -0,1761 & 0,0880 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 24,31 & -48,62 & 24,31 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,0880 & -0,1761 & 0,0880 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 24,31 & -44,57 & 20,26 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,0880 & -0,1614 & 0,0733 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 30,39 & -60,78 & 30,39 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,1100 & -0,2201 & 0,1100 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 30,39 & -60,78 & 30,39 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,1100 & -0,2201 & 0,1100 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 30,39 & -60,78 & 30,39 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,1100 & -0,2201 & 0,1100 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 30,39 & -49,10 & 18,71 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,1100 & -0,1778 & 0,0677 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 37,42 & -74,84 & 37,42 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 37,42 & -74,84 & 37,42 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 37,42 & -74,84 & 37,42 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 37,42 & -60,59 & 23,17 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 23,17 & -46,34 & 23,17 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 23,17 & -46,34 & 23,17 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 23,17 & -46,34 & 23,17 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 23,17 & -31,16 & 7,99 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 7,99 & -15,98 & 7,99 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 7,99 & -15,98 & 7,99 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 7,99 & -15,98 & 7,99 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 7,99 & -7,99 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right] \times \begin{bmatrix} Z_1 \\ \hline Z_2 \end{bmatrix}$$