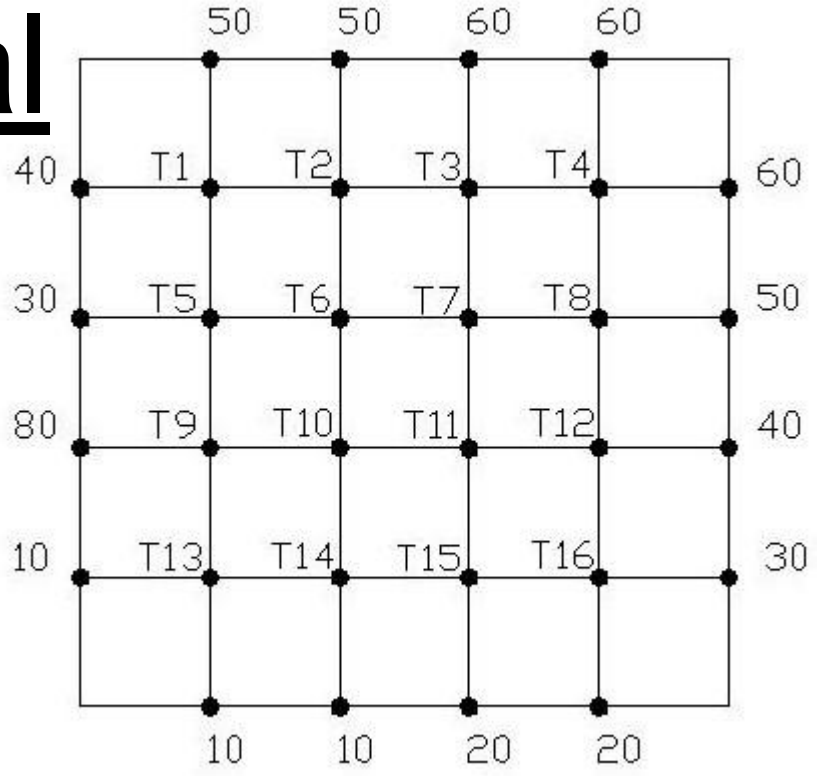
Temperatura sobre placa de metal



Integrantes:

- ANGEL, Tomás
- NAVALL, Nicolás Uriel
- NOGUERA, Dante

Planteo del Sistema

$$T_1 = \frac{50+40+T_2+T_5}{4} \Rightarrow 4T_1 - T_2 - T_5 = 90$$

$$T_2 = \frac{T_1+50+T_3+T6}{4} \Rightarrow 4T_2 - T_1 - T_3 - T_6 = 50$$

$$T_3 = \frac{60+T_4+T_7+T_2}{4} \Rightarrow 4T_3 - T_4 - T_7 - T_2 = 60$$

$$T_4 = \frac{T_3+60+60+T_8}{4} \Rightarrow 4T_4 - T_3 - T_8 = 120$$

$$T_5 = \frac{30+T_1+T_6+T_9}{4} \Rightarrow 4T_5 - T_1 - T_9 = 30$$

$$T_6 = \frac{T_5+T_2+T_7+T_10}{4} \Rightarrow 4T_6 - T_5 - T_2 - T_7 - T_10 = 0$$

$$T_7 = \frac{T_6+T_3+T_8+T_{11}}{4} \Rightarrow 4T_7 - T_6 - T_3 - T_8 - T_{11} = 0$$

$$T_8 = \frac{T_7+T_4+50+T_{12}}{4} \Rightarrow 4T_8 - T_7 - T_4 - T_{12} = 50$$

$$T_9 = \frac{20+T_3+T_{10}+T_{13}}{4} \Rightarrow 4T_9 - T_5 - T_{10} - T_{13} = 20$$

$$T_{10} = \frac{T_9+T_6+T_{11}+T_{14}}{4} \Rightarrow 4T_{10} - T_9 - T_6 - T_{11} - T_{14} = 0$$

$$T_{11} = \frac{T_{10}+T_7+T_{12}+T_{15}}{4} \Rightarrow 4T_{11} - T_{10} - T_7 - T_{15} = 0$$

$$T_{12} = \frac{T_{11}+T_8+40+T_{16}}{4} \Rightarrow 4T_{12} - T_{11} - T_8 - T_{16} = 40$$

$$T_{13} = \frac{10+T_9+T_{14}+10}{4} \Rightarrow 4T_{13} - T_9 - T_{14} = 20$$

$$T_{14} = \frac{T_{13}+T_{10}+T_{15}+10}{4} \Rightarrow 4T_{14} - T_{13} - T_{10} - T_{15} = 10$$

$$T_{15} = \frac{T_{14}+T_{11}+T_{16}+20}{4} \Rightarrow 4T_{15} - T_{14} - T_{12} = 20$$

$$T_{16} = \frac{T_{15}+T_{12}+30+20}{4} \Rightarrow 4T_{16} - T_{15} - T_{12} = 50$$

Matriz de coeficientes

$$m = \begin{pmatrix}
4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
-1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & -1 & 4 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
-1 & 0 & 0 & 0 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & 0 & 0 & 0 & -1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 4 & -1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4
\end{pmatrix}$$

Matriz aumentada

$$aum = \begin{pmatrix}
4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 90 \\
-1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 50 \\
0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 60 \\
0 & 0 & -1 & 4 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 120 \\
-1 & 0 & 0 & 0 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 30 \\
0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 50 \\
0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 & 20 \\
0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 0 & -1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & 0 & 0 & 0 & -1 & 40 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 4 & -1 & 0 & 0 & 20 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 0 & 10 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & -1 & 20 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -1 & 4 & 50
\end{pmatrix}$$

Codigo en Scilab

```
m=[4 -1 0 0 -1 0 0 0 0 0 0 0 0 0 0 0;
-1 4 -1 0 0 -1 0 0 0 0 0 0 0 0 0 0;
0 -1 4 -1 0 0 -1 0 0 0 0 0 0 0 0 0;
0 0 -1 4 0 0 0 -1 0 0 0 0 0 0 0 0;
-1 0 0 0 4 -1 0 0 -1 0 0 0 0 0 0 0;
0 -1 0 0 -1 4 -1 0 0 -1 0 0 0 0 0 0;
0 0 -1 0 0 -1 4 -1 0 0 -1 0 0 0 0 0;
0 0 0 -1 0 0 -1 4 0 0 0 -1 0 0 0 0;
0 0 0 0 -1 0 0 0 4 -1 0 0 -1 0 0 0;
0 0 0 0 0 -1 0 0 -1 4 -1 0 0 -1 0 0;
0 0 0 0 0 0 -1 0 0 -1 4 -1 0 0 -1 0;
0 0 0 0 0 0 0 -1 0 0 -1 4 0 0 0 -1;
0 0 0 0 0 0 0 0 -1 0 0 0 4 -1 0 0;
0 0 0 0 0 0 0 0 0 -1 0 0 -1 4 -1 0;
0 0 0 0 0 0 0 0 0 0 -1 0 0 -1 4 -1;
0 0 0 0 0 0 0 0 0 0 0 -1 0 0 -1 4];

aum=[4 -1 0 0 -1 0 0 0 0 0 0 0 0 0 0 0 90;
-1 4 -1 0 0 -1 0 0 0 0 0 0 0 0 0 0 50;
0 -1 4 -1 0 0 -1 0 0 0 0 0 0 0 0 0 60;
0 0 -1 4 0 0 0 -1 0 0 0 0 0 0 0 0 120;
-1 0 0 0 4 -1 0 0 -1 0 0 0 0 0 0 0 30;
0 -1 0 0 -1 4 -1 0 0 -1 0 0 0 0 0 0 0;
0 0 -1 0 0 -1 4 -1 0 0 -1 0 0 0 0 0 0;
0 0 0 -1 0 0 -1 4 0 0 0 -1 0 0 0 0 50;
0 0 0 0 -1 0 0 0 4 -1 0 0 -1 0 0 0 20;
0 0 0 0 0 -1 0 0 -1 4 -1 0 0 -1 0 0 0;
0 0 0 0 0 0 -1 0 0 -1 4 -1 0 0 -1 0 0;
0 0 0 0 0 0 0 -1 0 0 -1 4 0 0 0 -1 40;
0 0 0 0 0 0 0 0 -1 0 0 0 4 -1 0 0 20;
0 0 0 0 0 0 0 0 0 -1 0 0 -1 4 -1 0 10;
0 0 0 0 0 0 0 0 0 0 -1 0 0 -1 4 -1 20;
0 0 0 0 0 0 0 0 0 0 0 -1 0 0 -1 4 50];

r=[90;50;60;120;30;0;0;50;20;0;0;40;20;10;20;50];

rref(aum) //Eliminacion gauss-jordan de la matriz aumentada
minv=inv(m) //Invertida de la matriz m
i=minv*r //Producto de la matriz invertida y el resultado

[L,U]= lu(aum) //U matriz por eliminacion de gauss, sin pivote 1

//Operaciones con filas para que los pivotes nos den 1

U(1,:)=U(1,:)/4
U(2,:)=U(2,:)/3.75
U(3,:)=U(3,:)/3.7333333
U(4,:)=U(4,:)/3.7321429
U(5,:)=U(5,:)/3.7320574
U(6,:)=U(6,:)/3.4051282
U(7,:)=U(7,:)/3.3689759
U(8,:)=U(8,:)/3.3867903
U(9,:)=U(9,:)/3.7047352
U(10,:)=U(10,:)/3.3495707
U(11,:)=U(11,:)/3.3022233
U(12,:)=U(12,:)/3.3338173
U(13,:)=U(13,:)/3.7000435
U(14,:)=U(14,:)/3.3362099
U(15,:)=U(15,:)/3.2846019
U(16,:)=U(16,:)/3.3215903


tic();i=minv*r;toc() //Tiempo que tarda en dar el resultado habiendo invertido antes la matriz
tic();i=inv(m)*r;toc() //Tiempo que tarda en dar el resultado sin haber invertido antes la matriz
tic();i=rref(aum);toc() //Tiempo que tarda en hacer gauss-jordan

tic();[L,U]= lu(aum) //Tiempo que tarda en hacer eliminacion por Gauss

U(1,:)=U(1,:)/4
U(2,:)=U(2,:)/3.75
U(3,:)=U(3,:)/3.7333333
U(4,:)=U(4,:)/3.7321429
U(5,:)=U(5,:)/3.7320574
U(6,:)=U(6,:)/3.4051282
U(7,:)=U(7,:)/3.3689759
U(8,:)=U(8,:)/3.3867903
U(9,:)=U(9,:)/3.7047352
U(10,:)=U(10,:)/3.3495707
U(11,:)=U(11,:)/3.3022233
U(12,:)=U(12,:)/3.3338173
U(13,:)=U(13,:)/3.7000435
U(14,:)=U(14,:)/3.3362099
U(15,:)=U(15,:)/3.2846019,toc()
```

Resolución por método de Gauss-Jordan

```
--> rref(aum)
 ans  =

   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   42.045455
   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   44.772727
   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   50.
   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   53.863636
   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   33.409091
   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   37.045455
   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   41.363636
   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   45.454545
   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   24.545455
   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   28.636364
   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   32.954545
   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   36.590909
   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   16.136364
   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   20.
   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   25.227273
   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   27.954545


--> tic();i=rref(aum);toc()
 ans  =

   0.0019773
```

=1977,3μs

Resolución por método de matriz invertida

```
--> minv=inv(m)
 minv  =


       column 1 to 14

  0.3010606   0.1021212   0.0380303   0.0133333   0.1021212   0.0693939   0.0366667   0.015303    0.0380303   0.0366667   0.0239394   0.0112121   0.0133333   0.015303
  0.1021212   0.3390909   0.1154545   0.0380303   0.0693939   0.1387879   0.084697    0.0366667   0.0366667   0.0619697   0.0478788   0.0239394   0.015303    0.0245455
  0.0380303   0.1154545   0.3390909   0.1021212   0.0366667   0.084697    0.1387879   0.0693939   0.0239394   0.0478788   0.0619697   0.0366667   0.0112121   0.0209091
  0.0133333   0.0380303   0.1021212   0.3010606   0.015303    0.0366667   0.0693939   0.1021212   0.0112121   0.0239394   0.0366667   0.0380303   0.0056061   0.0112121
  0.1021212   0.0693939   0.0366667   0.015303    0.3390909   0.1387879   0.0619697   0.0245455   0.1154545   0.084697    0.0478788   0.0209091   0.0380303   0.0366667
  0.0693939   0.1387879   0.084697    0.0366667   0.1387879   0.4010606   0.1633333   0.0619697   0.084697    0.1633333   0.1056061   0.0478788   0.0366667   0.0619697
  0.0366667   0.084697    0.1387879   0.0693939   0.0619697   0.1633333   0.4010606   0.1387879   0.0478788   0.1056061   0.1633333   0.084697    0.0239394   0.0478788
  0.015303    0.0366667   0.0693939   0.1021212   0.0245455   0.0619697   0.1387879   0.3390909   0.0209091   0.0478788   0.084697    0.1154545   0.0112121   0.0239394
  0.0380303   0.0366667   0.0239394   0.0112121   0.1154545   0.084697    0.0478788   0.0209091   0.3390909   0.1387879   0.0619697   0.0245455   0.1021212   0.0693939
  0.0366667   0.0619697   0.0478788   0.0239394   0.084697    0.1633333   0.1056061   0.0478788   0.1387879   0.4010606   0.1633333   0.0619697   0.0693939   0.1387879
  0.0239394   0.0478788   0.0619697   0.0366667   0.0478788   0.1056061   0.1633333   0.084697    0.0619697   0.1633333   0.4010606   0.1387879   0.0366667   0.084697
  0.0112121   0.0239394   0.0366667   0.0380303   0.0209091   0.0478788   0.084697    0.1154545   0.0245455   0.0619697   0.1387879   0.3390909   0.015303    0.0366667
  0.0133333   0.015303    0.0112121   0.0056061   0.0380303   0.0366667   0.0239394   0.0112121   0.1021212   0.0693939   0.0366667   0.015303    0.3010606   0.1021212
  0.015303    0.0245455   0.0209091   0.0112121   0.0366667   0.0619697   0.0478788   0.0239394   0.0693939   0.1387879   0.084697    0.0366667   0.1021212   0.3390909
  0.0112121   0.0209091   0.0245455   0.015303    0.0239394   0.0478788   0.0619697   0.0366667   0.0366667   0.084697    0.1387879   0.0693939   0.0380303   0.1154545
  0.0056061   0.0112121   0.015303    0.0133333   0.0112121   0.0239394   0.0366667   0.0380303   0.015303    0.0366667   0.0693939   0.1021212   0.0133333   0.0380303

       column 15 to 16

  0.0112121   0.0056061
  0.0209091   0.0112121
  0.0245455   0.015303
  0.015303    0.0133333
  0.0239394   0.0112121
  0.0478788   0.0239394
  0.0619697   0.0366667
  0.0366667   0.0380303
  0.0366667   0.015303
  0.084697    0.0366667
  0.1387879   0.0693939
  0.0693939   0.1021212
  0.0380303   0.0133333
  0.1154545   0.0380303
  0.3390909   0.1021212
  0.1021212   0.3010606
```

$$m \times x = r$$

$$m^{-1} \times m \times x = m^{-1} \times r \Rightarrow I \times x = m^{-1} \times r \Rightarrow x = m^{-1} \times r$$

```
--> inv(m)*r
 ans  =

   42.045455
   44.772727
   50.
   53.863636
   33.409091
   37.045455
   41.363636
   45.454545
   24.545455
   28.636364
   32.954545
   36.590909
   16.136364
   20.
   25.227273
   27.954545
```

```
--> tic();i=minv*r;toc()
 ans  =

   0.0000365
```

=36,5 µs

```
--> tic();i=inv(m)*r;toc()
 ans  =

   0.0001029
```

=102,9 µs

Metodo de eliminacion por Gauss

```
--> tic();[L,U]= lu(aum)
 U  =


        column 1 to 15

  4.  -1.      0.          0.         -1.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.   3.75   -1.          0.         -0.25       -1.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.   0.      3.7333333  -1.         -0.0666667  -0.2666667  -1.          0.          0.          0.          0.          0.          0.          0.          0.
  0.   0.      0.          3.7321429  -0.0178571  -0.0714286  -0.2678571  -1.          0.          0.          0.          0.          0.          0.          0.
  0.   0.      0.          0.          3.7320574  -1.0717703  -0.0191388  -0.0047847  -1.          0.          0.          0.          0.          0.          0.
  0.   0.      0.          0.          0.          3.4051282  -1.0820513  -0.0205128  -0.2871795  -1.          0.          0.          0.          0.          0.
  0.   0.      0.          0.          0.          0.          3.3689759  -1.0783133  -0.0963855  -0.3177711  -1.          0.          0.          0.          0.
  0.   0.      0.          0.          0.          0.          0.          3.3867903  -0.0338623  -0.1077336  -0.3200715  -1.          0.          0.          0.
  0.   0.      0.          0.          0.          0.          0.          0.          3.7047352  -1.0945059  -0.0318099  -0.0099984  -1.          0.          0.
  0.   0.      0.          0.          0.          0.          0.          0.          0.          3.3495707  -1.113902   -0.0347638  -0.2954343  -1.          0.
  0.   0.      0.          0.          0.          0.          0.          0.          0.          0.          3.3022233  -1.1061524  -0.1068332  -0.3325507  -1.
  0.   0.      0.          0.          0.          0.          0.          0.          0.          0.          0.          3.3338173  -0.0415511  -0.1217737  -0.334972
  0.   0.      0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          3.7000435  -1.100477   -0.0365268
  0.   0.      0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          3.3362099  -1.1238045
  0.   0.      0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          3.2846019
  0.   0.      0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

        column 16 to 17

  0.          90.
  0.          72.5
  0.          79.333333
  0.          141.25
  0.          59.425837
  0.          44.769231
  0.          45.918675
  0.          102.89003
  0.          42.041247
  0.          33.172118
  0.          34.74596
 -1.          82.47647
 -0.0124635   36.425824
 -0.0402338   37.248959
 -1.1141528   51.715912
  3.3215903   92.853548
```

```
--> U(15,:)=U(15,:)/3.2846019,toc()
 U  =


       column 1 to 15

  1.  -0.25   0.          0.         -0.25       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.   1.    -0.2666667   0.         -0.0666667  -0.2666667   0.          0.          0.          0.          0.          0.          0.          0.          0.
  0.   0.     1.         -0.2678571  -0.0178571  -0.0714286  -0.2678571   0.          0.          0.          0.          0.          0.          0.          0.
  0.   0.     0.          1.         -0.0047847  -0.0191388  -0.0717703  -0.2679426   0.          0.          0.          0.          0.          0.          0.
  0.   0.     0.          0.          1.         -0.2871795  -0.0051282  -0.0012821  -0.2679487   0.          0.          0.          0.          0.          0.
  0.   0.     0.          0.          0.          1.         -0.3177711  -0.0060241  -0.0843373  -0.2936747   0.          0.          0.          0.          0.
  0.   0.     0.          0.          0.          0.          1.         -0.3200715  -0.0286097  -0.0943228  -0.2968261   0.          0.          0.          0.
  0.   0.     0.          0.          0.          0.          0.          1.         -0.0099984  -0.0318099  -0.0945059  -0.2952648   0.          0.          0.
  0.   0.     0.          0.          0.          0.          0.          0.          1.         -0.2954343  -0.0085863  -0.0026988  -0.2699248   0.          0.
  0.   0.     0.          0.          0.          0.          0.          0.          0.          1.         -0.3325507  -0.0103786  -0.0882006  -0.2985457   0.
  0.   0.     0.          0.          0.          0.          0.          0.          0.          0.          1.         -0.334972   -0.0323519  -0.1007051  -0.3028263
  0.   0.     0.          0.          0.          0.          0.          0.          0.          0.          0.          1.         -0.0124635  -0.0365268  -0.100477
  0.   0.     0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          1.         -0.2974227  -0.009872
  0.   0.     0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          1.         -0.3368506
  0.   0.     0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.          1.

       column 16 to 17

  0.          22.5
  0.          19.333333
  0.          21.25
  0.          37.84689
  0.          15.923077
  0.          13.14759
  0.          13.629861
  0.          30.379806
  0.          11.347976
  0.          9.9033938
  0.          10.52199
 -0.2999564   24.739349
 -0.0033685   9.8447014
 -0.0120597   11.165053
 -0.3392048   15.744956
  3.3215903   92.853548

ans  =

  0.2071878
```

=207,1878 ms

Conclusiones

Gauss-Jordan: 1977,3*μ*s
Método de la matriz invertida: *102,9 μs*
Eliminacion por Gauss: *207,1878 ms*