

Processos difusivos e caminhada aleatória

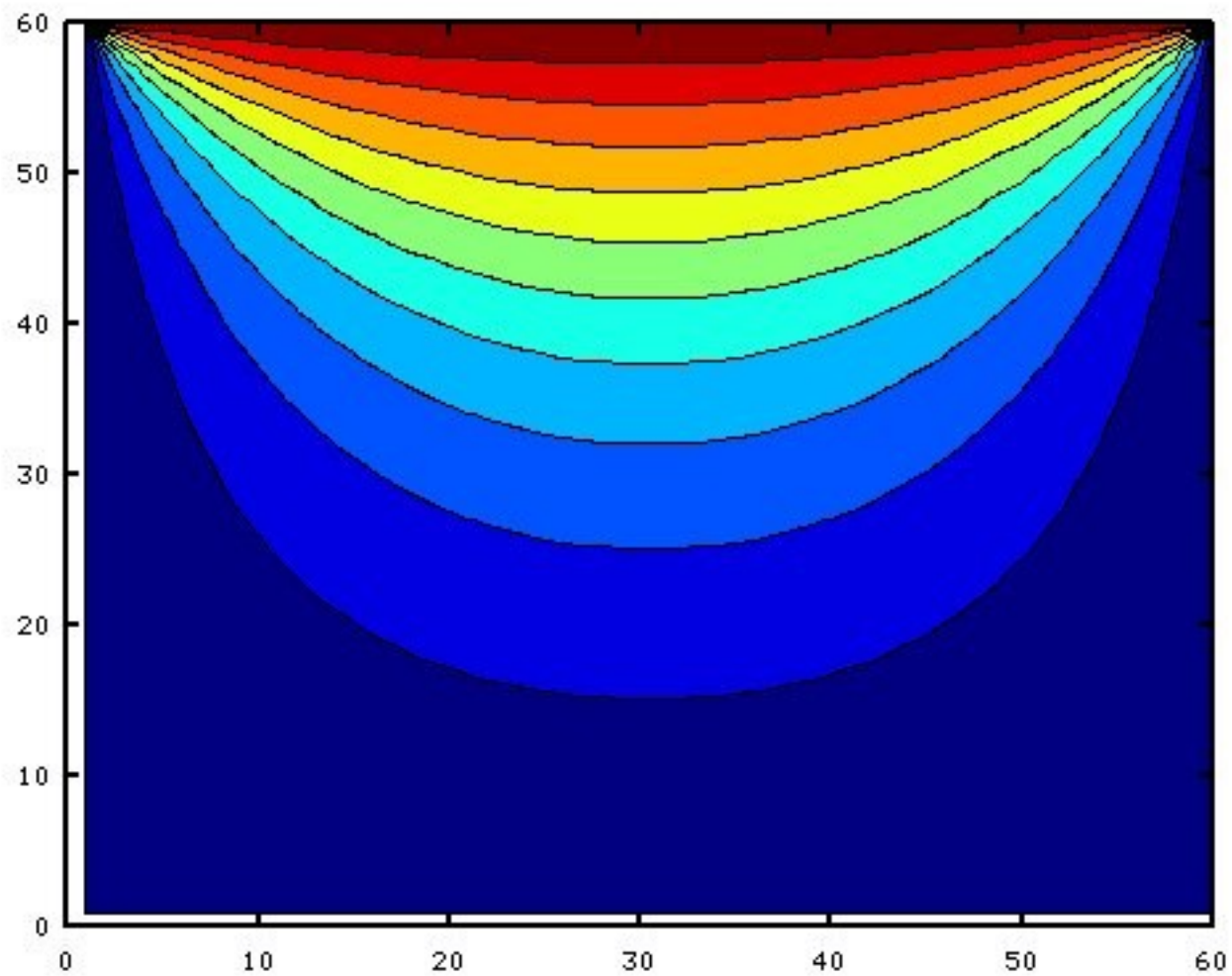
Seja uma quantidade evoluindo difusivamente (caminhada aleatória) em uma caixa.

Qual a probabilidade $P(x,y)$ de que acabe grudada na tampa superior, quando o ponto de partida é $X=(x,y)$?

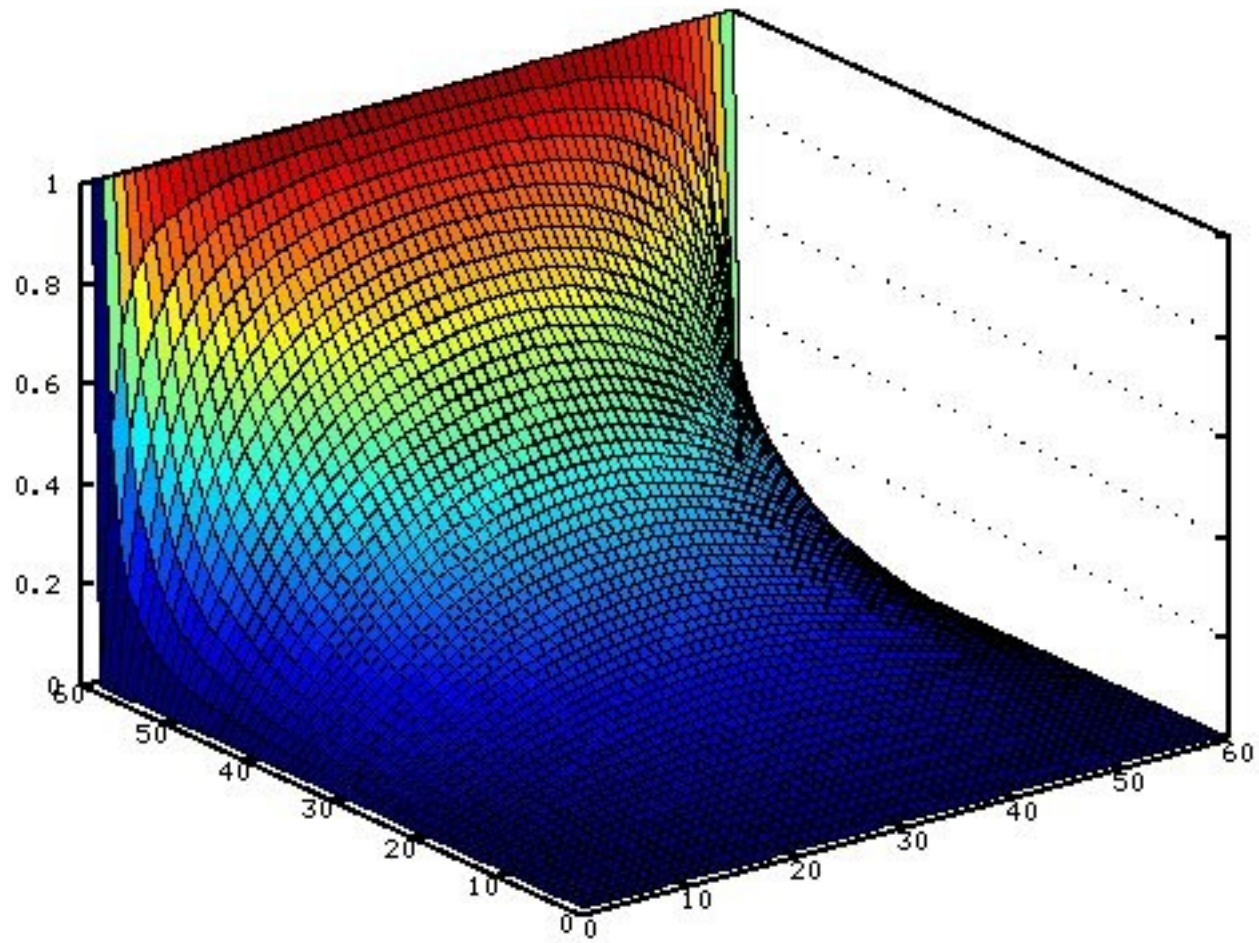
Necessariamente,

$$P(i,j) = 0.25*P(i+1,j) + 0.25*P(i-1,j) + 0.25*P(i,j+1) + 0.25*P(i,j-1)$$

```
octave:10> [xv yv nv nc con R] = circuito(60,60,1,1);
octave:11> a = matVtol(nv,nc,con,R);
octave:12> [atil b]=contorno(nv,a,60,60);
octave:13> x=atil\b;
octave:14> x2= reshape(x, 60, 60);
octave:15> contourf(x2)
octave:16> surf(x2)
```



65.5216, 30.8900



view: 60.0000, 322.500 scale: 1.00000, 1.00000

Cordas elásticas, membranas elásticas

Uma corda de tensão T une dois pontos, $x(i)$ e $x(i+1)$, que tem elevações de $h(i)$ e $h(i+1)$.

A força vertical no ponto i vale

$$F = T * \sin(\theta(i,i+1)) = T * (h(i+1)-h(i)) / dx$$

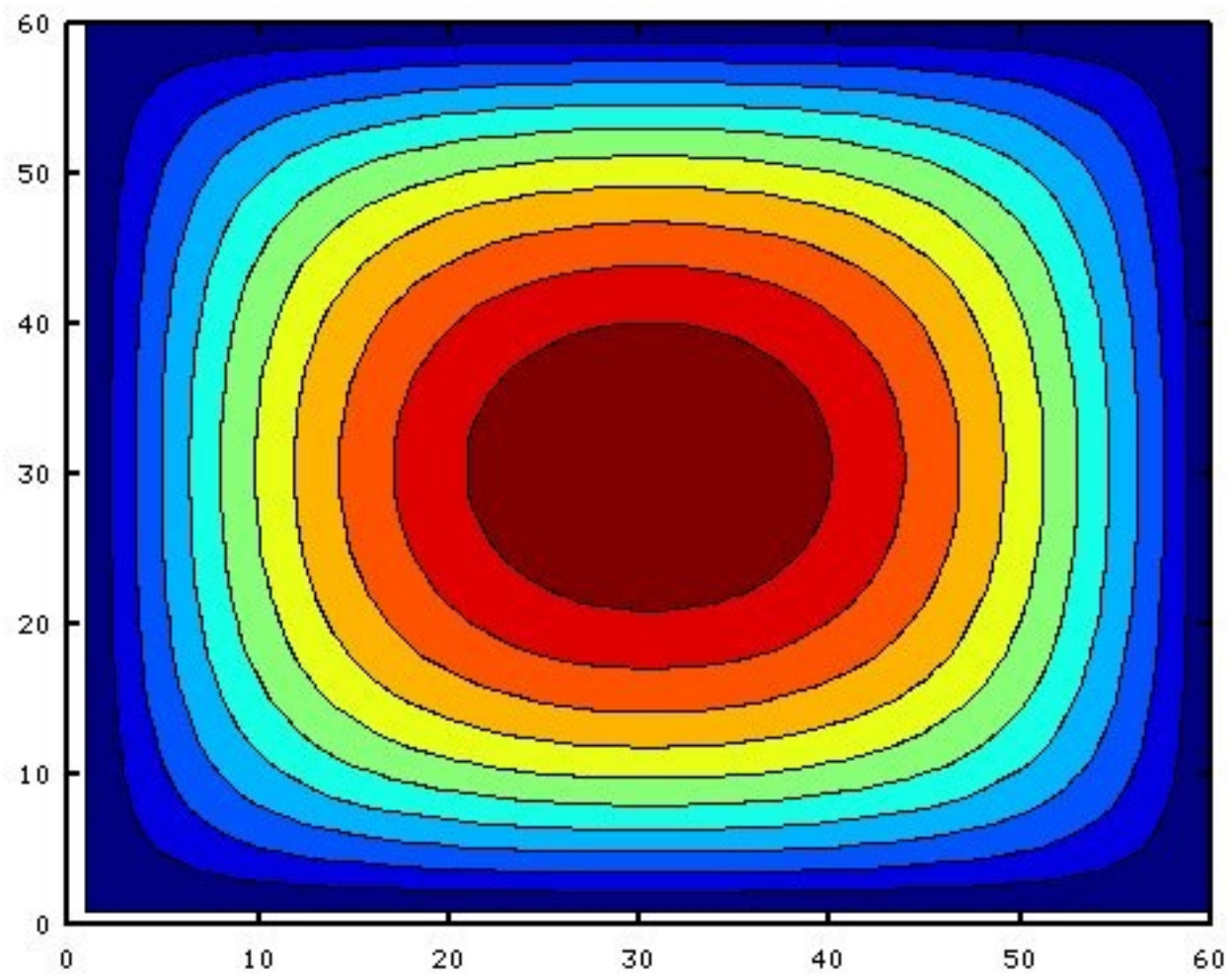
Assim, dado h , a resultante das forças membranais no ponto i vale

$$D(i) = T/dx * (h(i+1) - 2* h(i) + h(i-1))$$

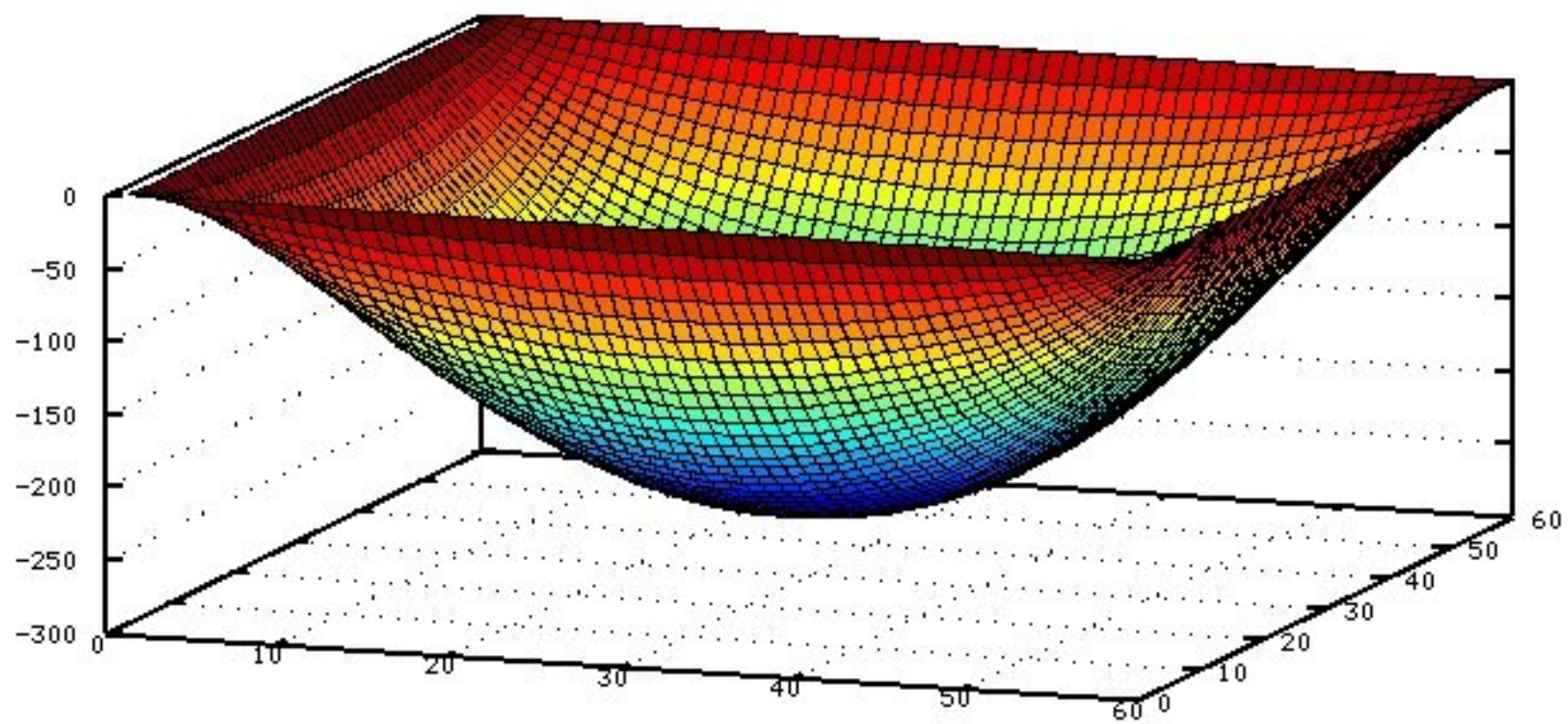
que deve ser igual à força aplicada no ponto.

Equivalente a circuitos, com $h==V$, $F==I$, $R==dx/T$, força aplic == corrente externa.

```
octave:> [xv yv nv nc con R] = circuito(60,60,1,1);
octave:> a = matVtol(nv,nc,con,R);
octave:> [atil b]=contorno2(nv,a,60,60);
octave:> y=atil\b;
octave:> y2= reshape(y, 60, 60);
octave:> contourf(y2)
octave:> surf(y2)
```

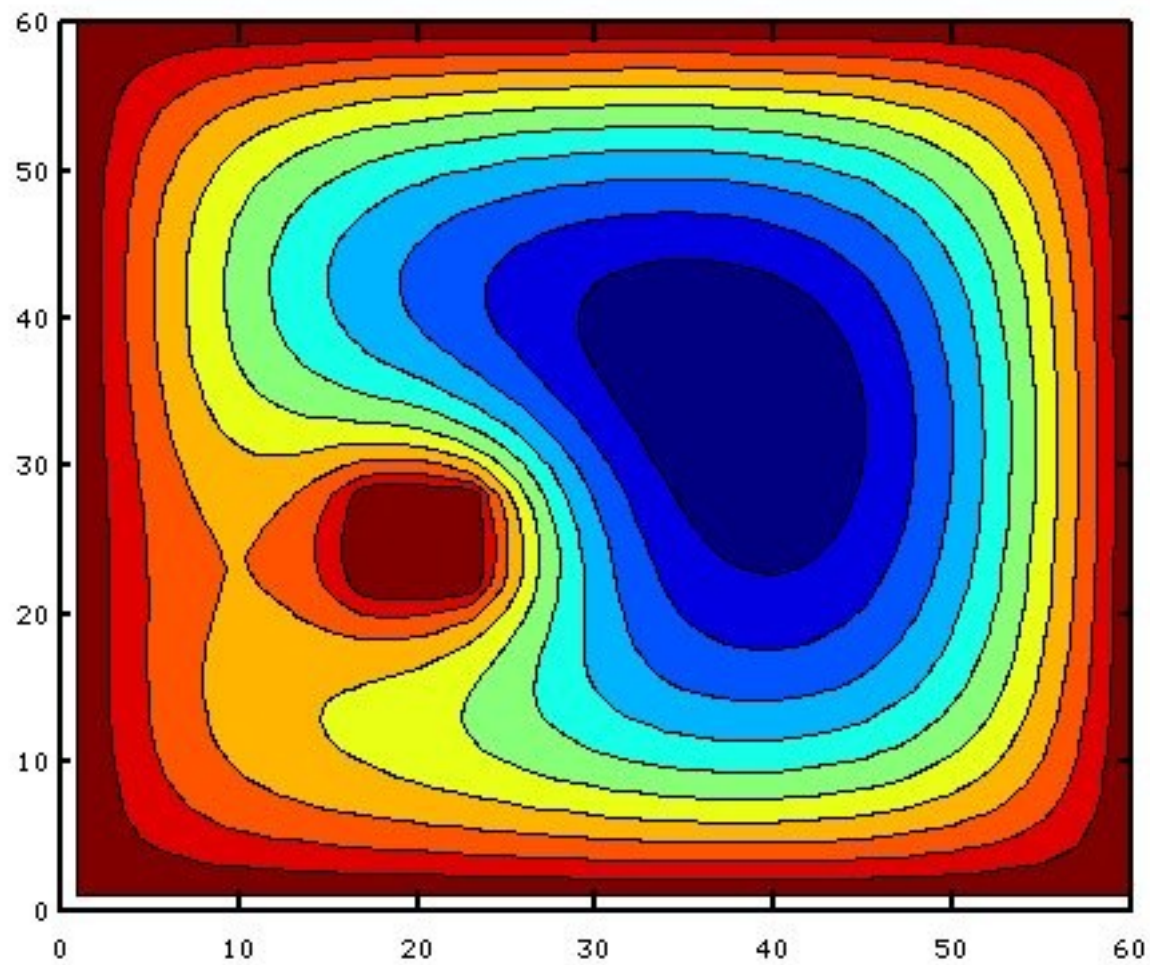


64.4059, -1.02487

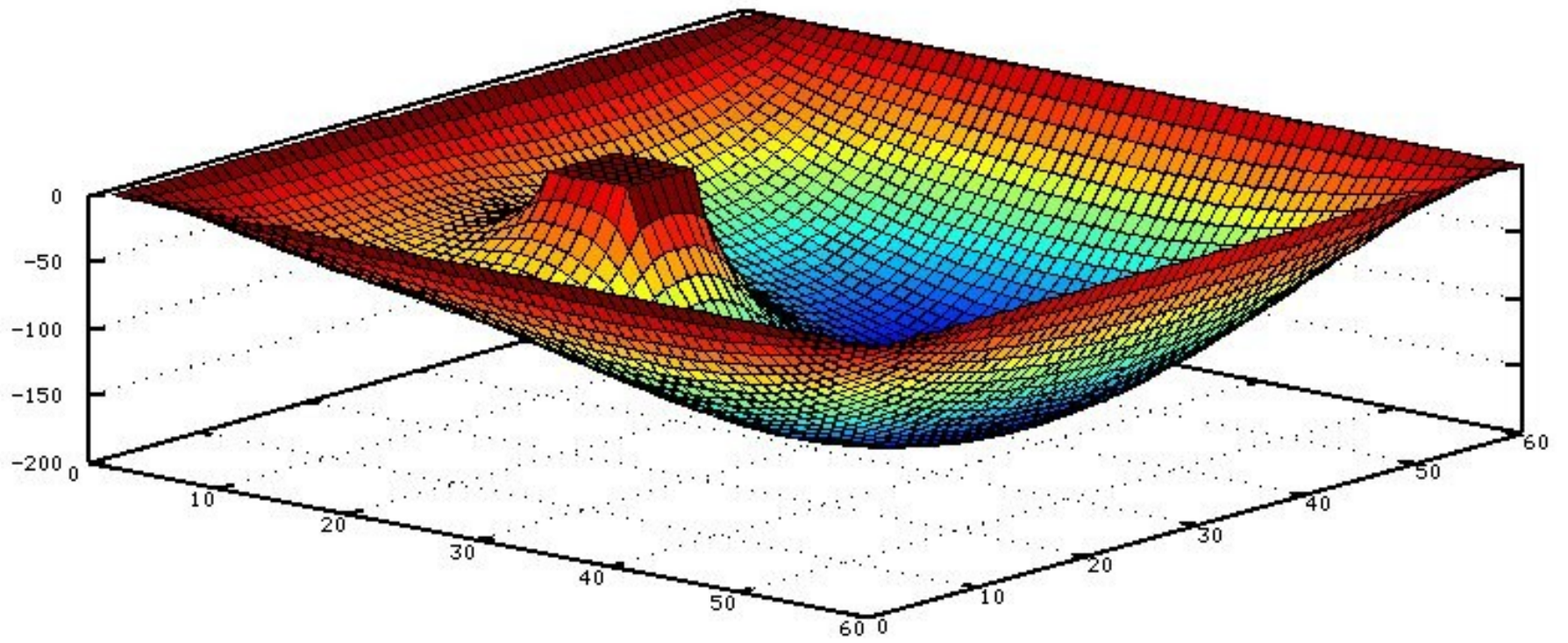


view: 66.0000, 20.0000 scale: 1.00000, 1.00000

```
function [atil b]=contorno2(nv,a,n,m)
atil=a;
b=-ones(nv,1);
for i=1:n
    for j=1:m
        if ((i==1 || i==n) || (j==1 || j==n) || (|j-20|<4 && |i-25|<4))
            k=(j-1)*n + i;
            atil(k,:)=0;
            atil(k,k)=1;
            b(k)=0;
        end
    end
end
end
```



53.8544, -8.91819



view: 48,0000, 40,0000 scale: 1,00000, 1,00000