Main

```
global N h k0 k1 x ff
ff = @(x) 100*exp(-(10*(x-0.5)).^2);

%Рассчетная сетка
a = -1;
b = 1;
N = 128;
h = (b-a)/N;
x = a:h:b;

%Точность
epsilon = 10^(-12);

%Параметры схемы
k0 = 1;
k1 = 0;

u = zeros(size(x, 2), 1);

u = Newton(u, epsilon);

hold on; grid on;
plot(x,u, 'm')
title('non-liner scheme solution')
```

Newton.m

```
function u = Newton(u, epsilon)
global N
    dx = inf;
    J = zeros(N+1);
    rho = 10^-5;

    while(norm(dx) > epsilon)
        for j = 2:N
            dU = zeros(N+1,1);
            dU(j) = rho;
            J(:,j) = (F5(u + dU) - F5(u - dU))/(2*rho);
        end

        J(1,1) = 1;
        J(N+1,N+1) = 1;
        dx = J\-F5(u);
        u = u + dx;
    end
```

```
end
```

F5.m

```
function y =  F5(u)

global N h k0 k1 x ff

y = zeros(N+1,1);
y(1) = u(1);
y(N+1) = u(N+1);

for n = 2:N
    y(n) = (u(n+1) - u(n))*(k0 + k1*(u(n)^2+u(n+1)^2)/2) -(u(n) - u(n-1))*(k0 + k1*
(u(n)^2+u(n-1)^2)/2) -h^2*ff(x(n));
end
end
```

Result