편집기 - C:₩Users₩김정민₩Documents₩MATLAB₩Gauss_Seidel.m

main.m | Gauss_Seidel.m | SOR.m | conjgrad.m | steepd.m | jacobi.m | +

```
function x = Gauss_Seidel(A,b)

x = zeros(length(b),1);
normVal = Inf;
tol = 1e-5;

while normVal>tol
    xold = x;
    for i=1:16
        sigma=0;
        for j=1:16
            if j~=i
                sigma= sigma+A(i,j)*x(j);
            end
        end
        x(i) = (1/A(i,i))*(b(i)-sigma);
    end
    normVal=norm(xold-x);

end

```

```
tx =

    2.5583
    4.0864
    4.5955
    3.6311
    5.1470
    7.1917
    7.6644
    5.9288
    5.8379
    5.8689
    5.9417
    4.4197
    3.3356
    4.5045
    4.8136
    3.8083


ans =

   6.7722e-07
```

```
function x = SOR(A,b,x_0,omega)
format long;
N = 1000;
n = length(A);
tol = 1e-5;
x =zeros(n,1);
D = diag(diag(A));
L = -tril(A,-1);
U = -triu(A,1);
a = (D-omega*L);

for i=1:N
    x = a\(((1-omega)*D + omega*U)*x_0) + omega*(a\b);
    if norm(x-x_0)<tol
        break;
    end
    x_0=x;


end
```

```
tx =

    2.558331791628071
    4.086362197536943
    4.595453711663862
    3.631060306023083
    5.146968255299607
    7.191665315608069
    7.664393157192674
    5.928787597152062
    5.837877954158740
    5.868938612259196
    5.941666212558609
    4.419696806174846
    3.335605760740361
    4.504545172988895
    4.813636200108298
    3.808333274362993


ans =

     1.655296961768583e-07
```

main.m | Gauss_Seidel.m | SOR.m | conjgrad.m | steepd.m | jacobi.m | +

```
function x = conjgrad(A,b,tol)

    if nargin<3
        tol=1e-10;
    end
    x = b;
    r = b - A*x;
    if norm(r) < tol
        return
    end
    y = -r;
    z = A*y;
    s = y'*z;
    t = (r'*y)/s;
    x = x + t*y;

    for k = 1:numel(b)
       r = r - t*z;
       if( norm(r) < tol )
            return;
       end
       B = (r'*z)/s;
       y = -r + B*y;
       z = A*y;
       s = y'*z;
       t = (r'*y)/s;
       x = x + t*y;
    end
 end
```

```
tx =

   2.558333333333333
   4.086363636363638
   4.595454545454546
   3.631060606060607
   5.146969696969697
   7.191666666666666
   7.664393939393939
   5.928787878787878
   5.837878787878788
   5.868939393939394
   5.941666666666667
   4.419696969696969
   3.335606060606060
   4.504545454545455
   4.813636363636363
   3.808333333333334


ans =

     2.377675446455376e-16
```

Gauss-Seidel, SOR, CGM 순으로 결과의 상대오차가 작아는 걸 알 수 있다.