Computer Engineering Department &
Information Technology Engineering Department

Academic Year: 2021-2022

Class: S.Y.B.Tech   **Sem.:** 4 **Course:** Linear Algebra

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Experiment No.	6		

AIM:	To implement Gauss seidel method in scilab
THEORY:	## What is meant by Gauss-Seidel method? In numerical linear algebra, the Gauss–Seidel method, also known as the Liebmann method or the method of successive displacement, is an iterative method used to solve a system of linear equations.

PROBLEMS

| CODE: | ```
printf("\n")

A=input("Enter the coefficents: ")

b=input("Enter the right-hand side C: ")

[m,n]=size(A)

[r,s]=size(b)

C=[A b]
sum=0

for i=1:n
    sum=0
    for j=1:n
        if i~=j
            sum=sum+abs(C(i,j))
        end
``` |
|---|---|

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```
         end
       if abs(C(i,i)) >sum
          continue;
       else
          error("The matrix is not diagonally dominated")
       end
   end

   printf("The matrix is diagonally dominated matrix")

   x0=0
   y0=0
   z0=0

   function display(x,y,z,tempx,tempy,tempz)

      printf(" Var\t| Initial\t| After\t|")
      printf("\n----------------------------------------")
      printf("\n  X\t|  %f\t|  %f\t|",x,tempx)
      printf("\n  Y\t|  %f\t|  %f\t|",y,tempy)
      printf("\n  Z\t|  %f\t|  %f\t|",z,tempz)
   endfunction

   counter=10
   limit =0.00001
   for i=1:counter
      x1=(C(1,4)-C(1,2)*y0 -C(1,3)*z0)/C(1,1)
      y1=(C(2,4)-C(2,1)*x1-C(2,3)*z0)/C(2,2)
      z1=(C(3,4)-C(3,1)*x1-C(3,2)*y1)/C(3,3)

      diffX=x1-x0;
      diffY=y1-y0;
      diffZ=z1-z0;

      if (abs(diffX)<=limit && abs(diffY)<=limit &&
   abs(diffZ)<=limit)
          break
      end
```

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```
printf("\n\nIteration: %d\n",i)
display(x0,y0,z0,x1,y1,z1)
x0=x1
y0=y1
z0=z1

end

printf("\n\nFinal result:\n\n  X=> %f Y=> %f Z=>
%f\n",x1,y1,z1)
```

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<td>**OUTPUT:**</td>
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```
Enter the coefficents: [27, 6, -1; 6, 15, 2; 1, 1, 54]

Enter the right-hand side C: [85; 72; 110]

The matrix is diagonally dominated matrix

Iteration: 1
 Var  |  Initial      |  After       |
----------------------------------------
  X   |  0.000000     |  3.148148    |
  Y   |  0.000000     |  3.540741    |
  Z   |  0.000000     |  1.913169    |

Iteration: 2
 Var  |  Initial      |  After       |
----------------------------------------
  X   |  3.148148     |  2.432175    |
  Y   |  3.540741     |  3.572041    |
  Z   |  1.913169     |  1.925848    |
```

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```
Iteration: 3
  Var   |  Initial       |  After         |
------------------------------------------------
   X    |  2.432175      |  2.425689      |
   Y    |  3.572041      |  3.572945      |
   Z    |  1.925848      |  1.925951      |

Iteration: 4
  Var   |  Initial       |  After         |
------------------------------------------------
   X    |  2.425689      |  2.425492      |
   Y    |  3.572945      |  3.573010      |
   Z    |  1.925951      |  1.925954      |

Iteration: 5
  Var   |  Initial       |  After         |
------------------------------------------------
   X    |  2.425492      |  2.425478      |
   Y    |  3.573010      |  3.573015      |
   Z    |  1.925954      |  1.925954      |

Final result:

  X=> 2.425476 Y=> 3.573016 Z=> 1.925954
```

RESULT: Learnt about the Gauss Seidel which is a modified version of Gauss Jacobi method. Learnt how to implement the algorithm in scilab software