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Emerging Applications of SCILAB in Science, Technology, Engineering and Mathematics

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Abstract:- SCILAB is a open source software. SCILAB stands for scientific laboratory. It is very useful source for numerical computation and graphical problems. In this paper, author has discussed about its applications, and how to use it. SCILAB evaluates large derivations and numerical problems very easily. SCILAB is very easy to understand for beginners. It gives facility to solve lengthy proofs and derivations. If any error occurs in coding, it will indicate to programmer automatically

Keywords: SCILAB, numerical computations, open-source software.

1. Introduction

Operation research and numerical computation is the branch of mathematics. Mathematical research has been done by using these methods. There are large derivations and calculations in operation research and numerical computation. Numerical computations are very important for engineers also. Engineering research cannot be possible without mathematical operations like arithmetic operations, logical operations and graphical representation etc. for the same numerical operation are compulsory for college students. Graphical representations are very important for teachers. Also, it is very important for improving the teaching methodology. Students can easily understand the problems by graphical methods. Numerical analysis, algorithm developments and simulations can also be done in this open source SCILAB software. One of its important features is that it is a free software that can be download use directly from the internet. One more feature is that it isa very light software. If it is compared with MATLAB/Simulink, then where MATLAB is about 12GB software, SCILAB is only 150-200 MB software.

.**Objectives**

Programming and Modelling in SCILAB: -For programming and modelling in SCILAB, mainly two windows are used. First one is console window and second one is scinotes. Console window is used for direct programming in SCILAB. In console window, editing is not permissible. Scinotes is used for making graph, program, large derivations and numerical analysis etc. Scinotes gives the facility to editing in program. Program made in scinotes can be further save for later use. We can edit or modify the program in previously saved file.

    i.   Numerical Operation in SCILAB: - Numerical operation can be performed in SCILAB very easily.

2. Methods

Lorem Graphical operation in SCILAB: - A graph can be plot in SCILAB very easily. In this section the program is written in SCILAB as shown in figure 2. Figure 3 shows the corresponding graph of given program.

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Program

clf;

a=2;

x=[-5:1:5];

y=a*x;

plot(x,y,"r");

title('graph of ax','color','black','fontsize',5);
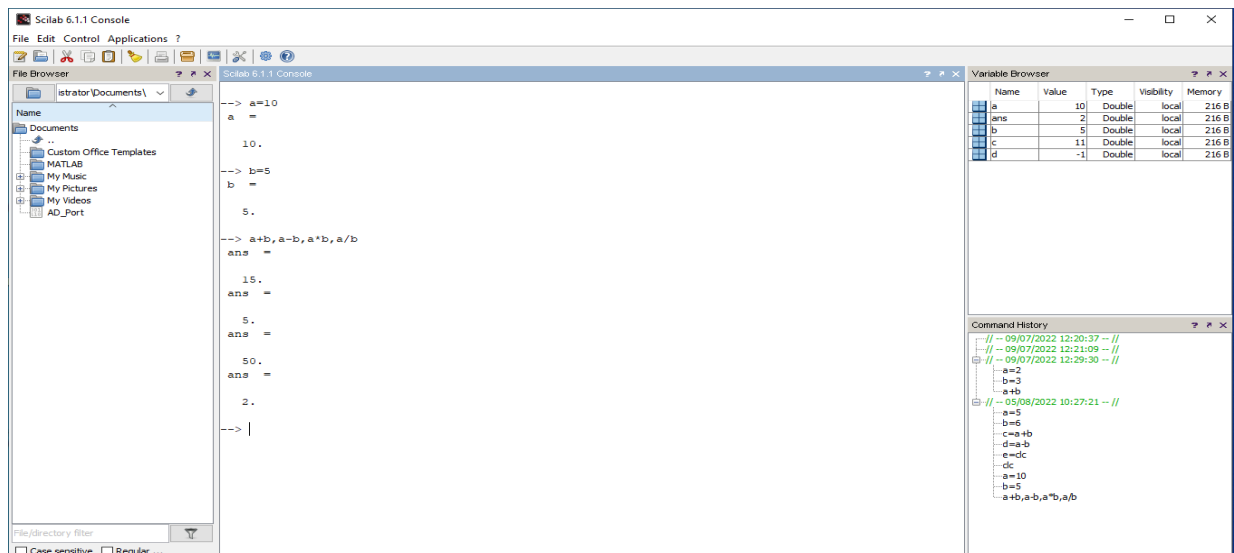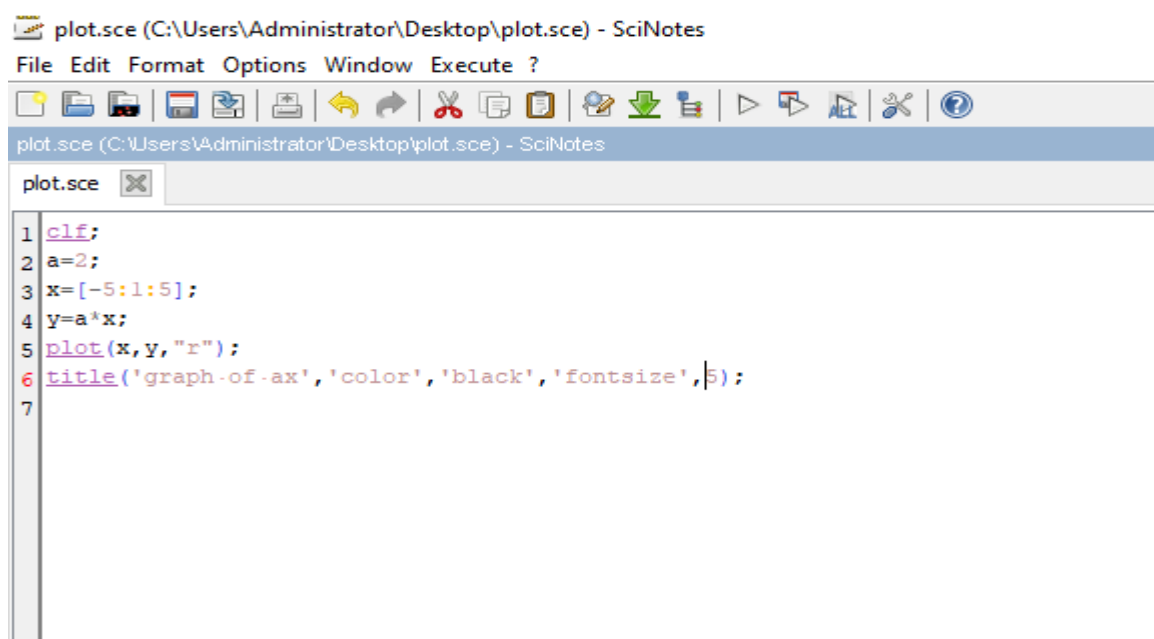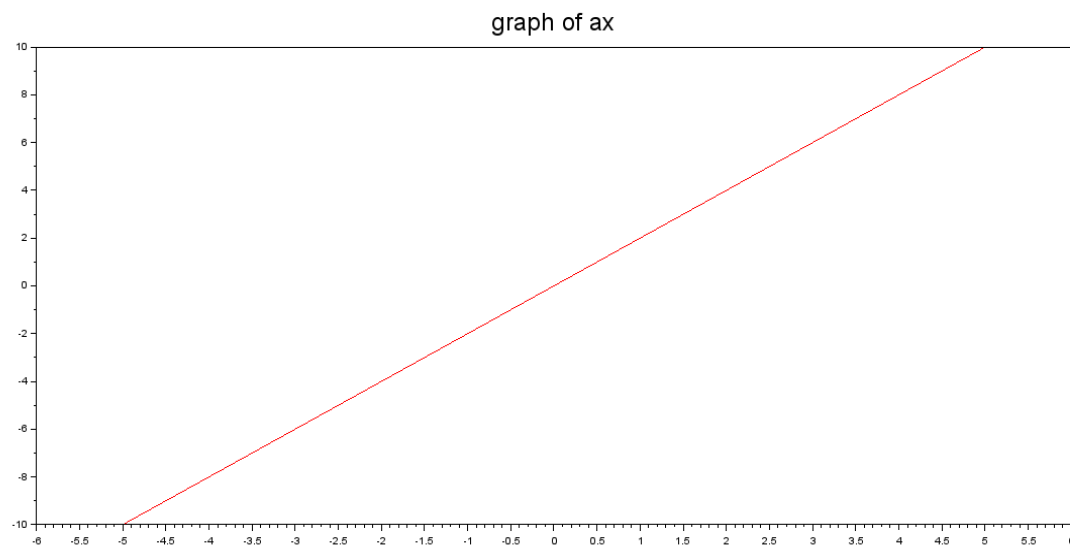

Fig 1 Numerical Operations in SCILAB

Fig 2 Program for graph y=ax

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Fig. 3 Graph y=ax

i. Ordinary Differential Equation Analysis in SCILAB

The tool box ode is used for solving the differential equations. It is used as primary toolbox. In the program below, it is showing the source code for the differential equation-

$$dy/dt = y^2 - y*\sin(t) + \cos(t) \tag{1}$$

Fig.4 is showing the dialog box of ode source code and figure 5 is showing the simulation figure of equation 1.

Fig. 4 ODE Analysis source code in SCILAB

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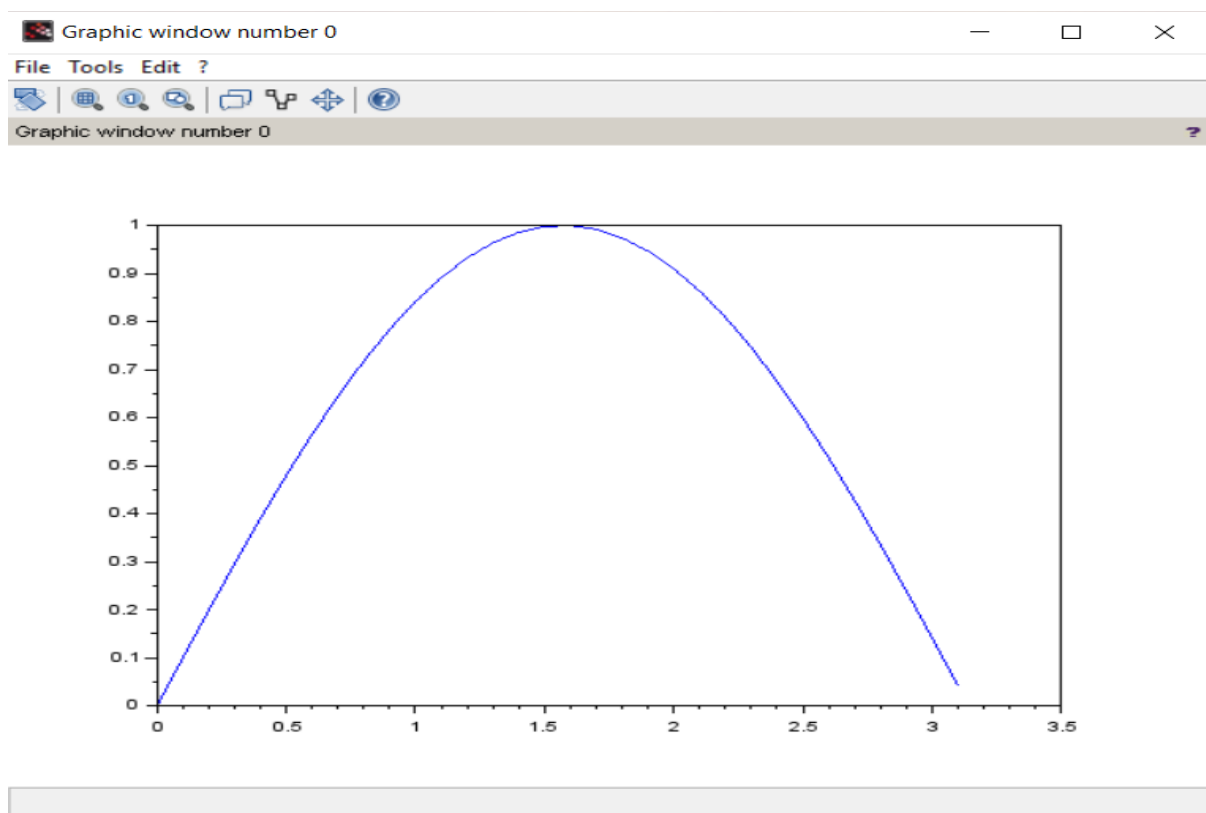
Fig. 5 Simulation Graph of ODE Example

ii.   Integration Analysis in SCILAB

The numerical analysis of integral function can also be done using SCILAB. The tool box *intg* is used for solving the integrating functions. Figure 6 showing the source code for equation 2-

$$Y=5x^3-3x^2-3x+3 \tag{2}$$

Fig.6 Source Code of Equation 2

In this source code integration of equation 2 has been done. Here it is integrated between a and b. where a=-0.8 & b=1.4. Figure 7 is showing simulation of source code for equation 2.

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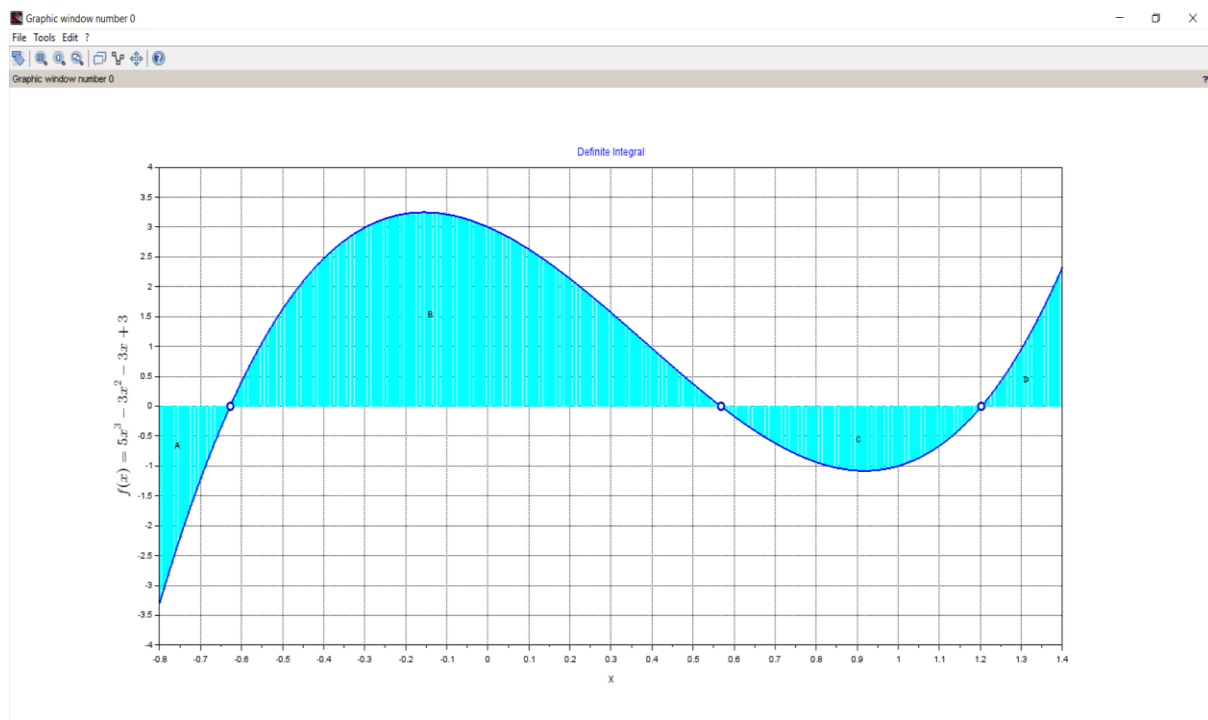
Fig.7 Simulation of intg Source Code

Results

Numerical Computation of Matrices in SCILAB

Numerical computation of matrices like addition, subtraction, multiplication and division can also be done using SCILAB. In SCILAB Matrices inverse and other matrices properties can be formulated very easily.

Fig.8Matrix Representation in SCILAB

Figure 8 showing, how to form a matrix in SCILAB code. It is very simple to make a m x n matrix in scilab. Clear operation is seen in figure 8.

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Scilab 6.1.1 Console                                                              ? ↗ X

--> // create zero matrix

--> D=zeros(3,3)
 D  =

   0.   0.   0.
   0.   0.   0.
   0.   0.   0.

--> // create ones matrix

--> E=ones(2,3)
 E  =

   1.   1.   1.
   1.   1.   1.

--> //create dioganol matrix

--> F=diag([1 2 5 6])
 F  =

   1.   0.   0.   0.
   0.   2.   0.   0.
   0.   0.   5.   0.
   0.   0.   0.   6.
```
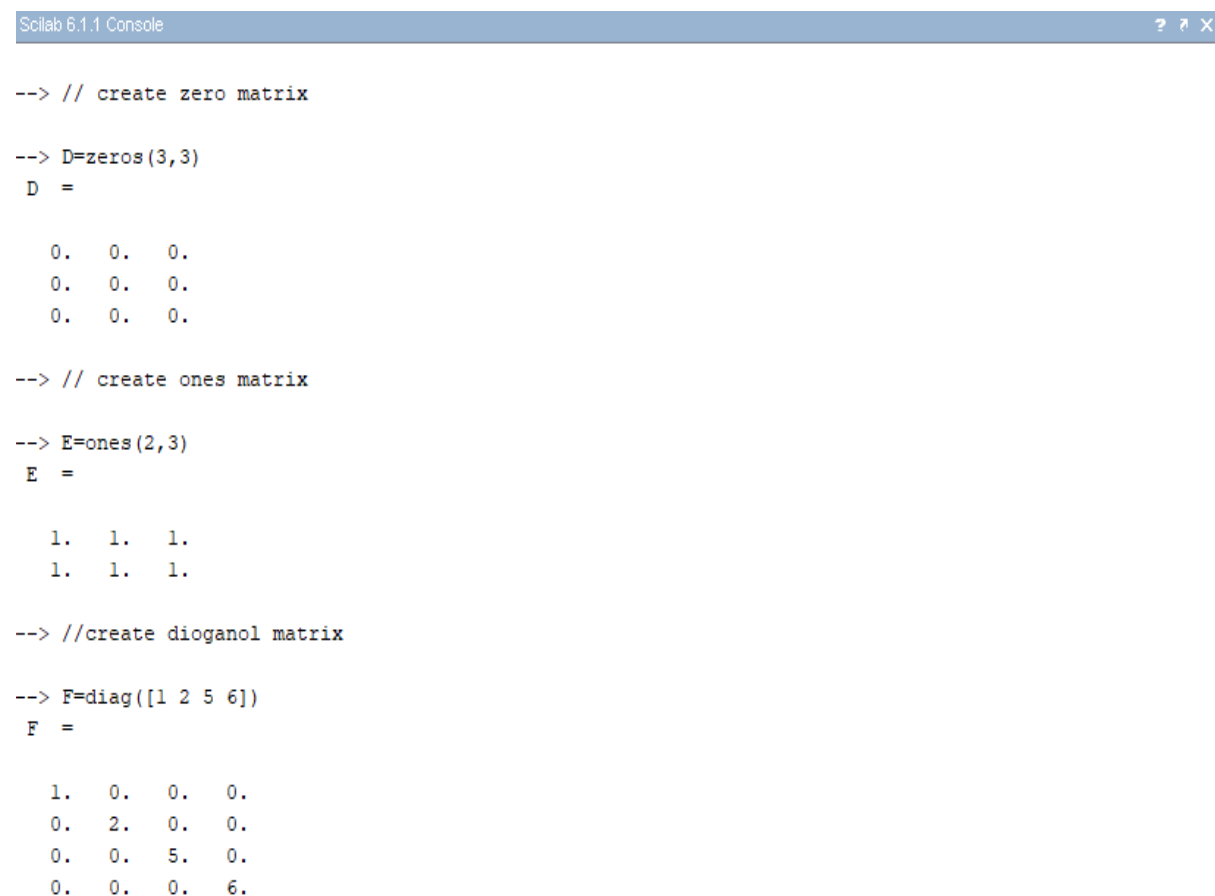
Fig.9 Matrix Properties in SCILAB

Figure 9 showing the different properties of matrices. A programmer can make zero matrix, unity matrix, diagonal matrix etc. for every property of matrix there is a different type of code in scilab. For example- source code *diag* is used for forming diagonal matrix. Similarly source code *zeros* and *ones* are used for zero matrix and unity matrix respectively.

Arithmetic Operation of Matrix in SCILAB

Arithmetic operation of matrices can be done very easily in SCILAB. Figure 10 showing the operation of addition, subtraction and multiplication of two matrices in SCILAB.

3. Discussion

SCILAB is a very easy to understand for learner. It is very useful in the research of mathematical field. It helps to researcher by save the lots of time. Highly complicated operation can be performed in scinotes. It is also used for modeling and simulation in industrial companies. Based on the above review it can be said that SCILAB is high growing, easy to use and engineering and science based software.

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