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A Review On The Comparative Roles Of Mathematical Softwares In Fostering Scientific And Mathematical Research

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Abstract

Mathematical software tools used in science, research and engineering have a developmental trend. Various subdivisions for mathematical software applications are available in the aforementioned areas but the research intent or problem under study, determines the choice of software required for mathematical analyses. Since these software applications have their limitations, the features present in one type are often augmented or complemented by revised versions of the original versions in order to increase their abilities to multi-task. For example, the dynamic mathematics software was designed with integrated advantages of different types of existing mathematics software as an improved version for understanding numerical related problems for advanced mathematical content (advanced simulation). In recent times, science institutions have adopted the use of computer codes in solving mathematics related problems. The treatment of complex numerical analysis with the aid of mathematical software is currently used in all branches of physical, biological and social sciences. However, the programming language for mathematics related software varies with their functionalities. Many invaluable researches have been compromised within the confines of unacceptable but expedient standards because of insufficient understanding of the valuable services the available variety of mathematical software could offer. In the developing countries, some mathematical software like Matlab and MathCAD are very common. A comparative review for some mathematical software was embarked upon in order to understand the advantages and limitations of some of the available mathematical software.

Keywords: Mathematical software; revised versions; applied mathematics; scientific challenges

1. INTRODUCTION

Due to advancement in technology, the acceptability of the use of mathematical software to solve problems relating to physical, biological and social sciences is overwhelming(Emetere 2014; 2015; Emetere et al., 2015a,b). In developing communities, Matlab, MathCAD and Microsoft Excel are the most common software used because of their accessibility. Although, other mathematical software, have shown equal competence with more functionalities. However, there is need to know the comparative advantages and limitations of some mathematical software.

Mathematics is a course that is often described as the mother of all subjects. This of course is absolutely true as other subjects are linked with mathematics in one way or the other. From the study of philosophy, we realize that mathematics was one of the paths that was trailed or explored by early thinkers to help them understand better, some phenomena that occur naturally and help improve life (other courses includes physics, biology, astronomy, metaphysics, etc.). A software is a set of instructions that can be understood by machines and the instructions inform the computer what to do (i.e. performs the required operations). Software are of two categories namely system software and application software.

Although, technology has improved widely, it is still pertinent to bring to the fore some mathematical tools that have assisted humanity; these are termed computer aided algebraic systems. Computer solutions to algebra related problems are implemented by users inform of algorithms using instruction codes and special syntaxes (Wikipedia, 2008b). In addition, most computer aided solutions of mathematical problems allow for graphical display of explicit or implicit equations, especially on platforms where such graphical presentations cannot be modified directly (Hohenwarter, 2002). Below are some of the aforementioned tools:

1.1 DYNAMIC SOFTWARE FOR GEOMETRY

The software for geometry related problems is the Dynamic Geometry Software (DGS). This is a computer application used to tackle problems in geometry (Straber, 2002). DGS is activated by means of geometric tools incorporated in the software which contains different shapes from which selections can be made. Examples include Cabri Geometry (Cabrilog SAS, 2007) and Geometer's Sketchpad (Key Curriculum Press, 2008). Although, it is common knowledge that these programs differ in terms of their features and applications, DGS has basic features such as drag mode, customizable, and trace or locus tools which are not part of the computer packages for algebraic modules or spreadsheet applications (Graumann et al., 1996). The Drag mode feature enables the creation of geometric sizes and figures using computer and several options of geometric tools and items on the menu list. Related objects and their dependencies are retained with objects inputted at updated positions by changing their dynamics. The *drag test* is a concept which not only grants users the opportunity to check the robustness of a drawing by merely dragging several objects into view, but also searches a list of similar drawings and special cases which may not be feasible in traditional construction. Besides movement, DGS provides the user, access to information about how to transform objects and take lengthwise and angulr measurements. Other inherent characteristics include insertion of text and images

which improve the outlook of any form of dynamic drawing. Customized geometric tools are usually packaged in toolboxes and are selected by clicking on the required icon from the list on the toolbar; this may also be achieved by the implementation of certain commands from the available menu. Furthermore, a set of instructions for a particular construction can be compiled and saved as a new tool; the presence of this special feature makes it easier for users to define within the available list, a set of construction tools in the toolbar. For Trace or locus, is drawn using the main object as reference; this helps users to examine mobility and reliance of one mathematical object relative to another. Hence, the locus of a point can either be determined manually by simply dragging corresponding objects into view or by automation using the software.

1.2 SOFTWARE TECHNOLOGY DEVELOPMENT AND MATHEMATICAL IMPLICATIONS

With the advent of DGS consists of basic mathematical features such as points, lines, segments, vectors, circles, and conic sections which apply to analytic geometry where coordinates of points are of the essence. Although, with the help of the keys on the computer keyboard, input of numbers and expressions may be possible with DGS, it is usually limited in application to a list of special characters and predefined expressions. Such input is mainly used when calculations can be incorporated in any construction in progress.

According to Straber (2002), from inception, DGS has earned a good spot and also grown to become, amongst others, one of the widely used software tool in the world's institutions. Its application to research is one good reason it ranks among the best most used application package in didactics of Mathematics.

1.3 SPREADSHEET APPLICATION SOFTWARE

Spreadsheet application tools include Super Pro, Ms Excel, Ms Access etc which help to bridge the gap between Mathematics and Algebra because of the ease of interaction between both worlds. Friedlander (1998), is a paper that discusses the importance of these packages to users as a means of creating patterns, constructing expressions in Algebra, concept generalization, conjectural justification, and establishment of the equality of two models as intrinsic rather than being arbitrary requirements as provided in our knowledge base. Spreadsheet software, are tools which allow for the display of a mix of alphabet and numeric texts or numbers in cells organized into columns and rows. Its formula tool can be exploited by use of the appropriate command syntax which must be initiated by an equal sign with calculated values displayed in cells after a tap on the Enter key. A slight adjustment to the contents of a cell modifies or updates the information contained in other cells within which the command applies (Wikipedia, 2008). Spreadsheet applications are essential tools for overcoming problems in mathematics and statistics. Furthermore, in Ozgun-Koca (2000), spreadsheet applications enable users focus on the mathematical initiatives lessens their involvements in calculations and algebraic manipulations. Spreadsheets such as Ms Excel (Microsoft Corp, 2007) and Calc (CollabNet Inc. 2008a) allow for chart display of information contained in generated data.

1.4 DYNAMIC MATHEMATICS SOFTWARE APPLICATION

Schumann and Green (2000) asserted the need for software modification to provide a single package with combined effects of the desired features in DGS and Algebraic Systems (AS). DMS combines the triple effect of DGS, AS, and spreadsheets in one entity known as the Dynamic Mathematics Software which differs from each in content as well as in the degree of interactions between its inherent features and user interfaces. DMS examples include GeoGebra (manufactured by Hohenwarter, 2008) and GeoNExT (by University at Bayreuth, 2007). In GeoGebra, several presentations of an item are in dynamic connection, which makes for users, the ease to go back and forth between different tasks thereby establishing comprehensible relationships among those presentations i.e. with adjustments on any presentation, all other related presentations adapt automatically. New items can be created by using the geometric tools or algebraic input keys. DMS also finds application in Calculus.

1.5 SOME POPULAR AND VERY USEFUL MATHEMATICS SOFTWARE PACKAGES

MATLAB is a hybrid sourced iterative computer software which is used for solving problems or evaluating systems. Using different platforms and extensions, MATLAB enables the user conduct mathematical operations of any type; created and suited for students, system developers and researchers. MATLAB is able to: perform mathematical operations, it can be used by engineers in design evaluation of systems, plot graphs and charts of different operations, perform complex mathematical operations, act as a simulator in analyzing different systems, explain different scientific phenomena, assist in the calibration of coaxial connectors in telecommunication, perform mathematical operations, synchronize with other computer programs, serve as a teaching aid for different operations while conducting lectures, evaluate projects, evaluate scientific research like weather prediction and in studying cosmic bodies. Although, it is only numeric, its optional toolbox uses the MuPAD symbolic engine, thus providing access to computer algebra capabilities. An additional package, Simulink, adds graphical multidomain simulation and Model-Based Design for dynamic and embedded systems. The MATLAB language contains mathematical functions, which provide maintenance for collective engineering and science processes. Essential functions in math make practical usage of processor-optimized libraries to offer rapid implementation of vector and matrix computations. MATLAB uses spreadsheets or traditional programming languages via simulation and visualize data with the main purpose of enabling researchers to gain insight into the data. Results from the MATLAB code are transferable and can be incorporated into other packages, for example, Matlab is incorporated into medical diagnostic software like SPM. MATLAB creates access into file formats such as Microsoft Excel to perform mathematical operation on datasets (Emetere et al., 2015c; 2015d); text or binary files; image, sound, video and scientific files such as netCDF and HDF. The File I/O function avails working with data files in any format.

Another computational software like Mathlab is Mathematica. It is used to solve problems that may be scientific, that is, biological or physical, mathematical, engineering and computing fields, based on sets of computational instructions.

Mathematica was developed by Stephen wolfram and the base of development of the program is in Illnois by Wolfram research campaign. The programming language used for the development of the software ware is Wolfram language and it is the major language used. There are two parts of Mathematica; the Kernel and Front end. The kernel interprets and transfers Mathematica codes using sets of computer language. While the front end, designed by Theodore Gray, provides a GUI, which allows the creation and editing of Notebook documents containing program code features such as: Matrix and data manipulation; 2 and 3D data and geo visualization; Linear and non linear control system libraries; Continuous and discrete integral transforms; Tools for financial analysis.

Microsoft Windows introduced a numerical coding system (Microsoft Excel) which works using the spread sheet. This programme has shown compatibility in other operating systems like Mac, Linus, Solaris e.t.c.. Microsoft Excel features; calculation in form of row and column, plotting tools either in 2D or 3D plots, pivot tables in form of statistical analysis and a macro programming language called known as visual basic.

As discussed above, Microsoft Excel makes use of grid of cells arranged systematically in form of rows, that is numbered accordingly and columns that can either be letter-named or numbered. The numbering enables operational organization of data and the manipulations of the data via arithmetic tools. Microsoft Excel is made up arithmetic functions to perform statistical, scientific, engineering, domestic and financial operation. In addition, it can display data as line graphs, polynomial plots, scattered plots, wavy/peak plots, histograms and charts with very limited three-dimensional graphical display. The Visual Basic Applications, that is, the programming aspect of Microsoft Excel equips the user with options like numerical methods in solving differential equations of mathematical physics, and then reporting the results back to the spread sheet. It also has a variety of interactive features allowing user interfaces that can completely hide the spread sheet from the user, so the spread sheet presents itself as a so-called application, or decision support system via a custom-designed user interface. Excel can be adjusted to the desired precision when used to carry out numerical simulation and has well defined features for embedding one chart in another.

Origin is also known as mathematical software which performs interactive scientific graphing and data analysis. Since Origin runs on Microsoft windows and also possess the ability to be incorporated into other scientific programms. It has inspired several platform-independent open-source clones like QtiPlot orSciDAVis. It has the operational support to perform a 2D/3D plot types. Data analyses in Origin include statistics, signal processing, curve fitting and peak analysis. Origin's curve fitting is performed by the nonlinear least squares fitter which is based on the Levenberg-Marquardt algorithm. Origin imports data files in various formats such as ASCII codes, Excel, NI TDM, DIADem, NetCDF, SPC, etc. It also exports the graph to various image file formats such as JPEG, GIF, EPS, TIFF, etc. There is also a built-in query tool for accessing database data via ADO.

Like Microsoft, the System for Algebra and Geometry Experimentation (SAGE) has mathematical software known as SageMath with features covering many aspects of

mathematics, including algebra, combinatorics numerical mathematics, number theory, and calculus. SageMath can be incorporated into other programmes, for example, SageMath was first incorporated into open source software under the terms of the GNU General Public License, with the initial goals competing with other mathematical tools like Magma, MathCAD, Maple, Origin, Mathematica, freemat and MATLAB. SageMath uses the Python programming language, supporting procedural, functional and object-oriented operations.

FreeMat is a numerical computational package adopted for solving numerical based researches. It is compatible with other commercial packages such as Matlab and Octave. The supported operating systems for FreeMat include windows, linux, and Mac OS X. The web page of FreeMat states that some of features for FreeMat include solution pathways for eigen value and vector oriented applications with their characteristic equations alongside singular value decompositions, 2D/3D plotting, parallel processing with MPI, handle-based graphics, function pointers, etc.

PolyMath, is a software that finds application in mathematical related problems especially in the field of chemical engineering where the occurrences in reaction systems may require some numerical computations to give detailed descriptions on the happenings within systems. Relationships between variables can be determined from such computations and the behavior of the system under different conditions may be established. The complexities associated with series consecutive and reversible reactions aided by heat application (endothermic reactions) and exothermic reactions are easily resolvable by the use of polymath which has an inbuilt programming facility that makes numerical computations easier than it would have been if done manually.

Another mathematical software package of utmost relevance in the oil and gas industry is HYSYS which is used in reservoir computations to determine fluid compositions in oil and gas wells and characterizes the wells by their compositions. It also has features for determining fluid properties and can be used to simulate behavioural trends of these fluids in systems such as pipes and reaction vessels. For plant simulations, Hysys has an object palette from which different equipment are interconnected within an existing plant. It can be used to predict accurately, the operating conditions in the various equipment during a production process. Column separation of fluid fractions/compositions by distillation is better understood by HYSYS as it reveals the composition of each component in its assay (crude oil assay). However, HYSYS cannot describe accurately the compositions of systems of liquid-solid mixtures as it is specifically designed for fluid (liquid / gaseous or a combination of both) systems.

2.0 COMPARATIVE ROLES OF MATLAB AND OTHER SOFTWARE

The C programming language is an example of a low-level compiled language also referred to as a 3rd generation language that is widely used in the academic world, industry and commerce. Fortran falls into the same category but while Fortran is still commonly used in academia, it appears to have been overpowered by C (and C++) in many of its applications industrially, C++ is more similar to C than it is to MATLAB

or Python. The main improvement of compiled low-level languages is in their execution speed and efficiency in embedded systems. It is observed that C program executes the same computation as the MATLAB program shown below. When it is compared to the MATLAB oriented program, this code is longer and carries statements in the form of wrapping of the main code into the main function and returns the exit status. Before any statements are executed it is necessary to declare the variable so as to let the program know what one is dealing with. Eventually, the user needs to compile the code. Some common problems users experience while programming in C include but not limited to the following (i) Indentation of for-loop (and other blocks) and scope (as defined by curly braces) do not agree, thus the for-loop executes incorrect commands. (ii) Missing semicolons, curly braces, parentheses around if-statement tests in amalgamation with more or less of use mistake messages from the compiler stop the compilation process.

2.1 MATLAB vs Java transcript

Java is a pure programming tool/software which can be used in conducting different functions in a computer. It is object oriented and is suitable for making applets and applications. It is the most used programming software. The similarities between MATLAB and Java transcript are: both MATLAB and Java are object oriented; both are case sensitive; they both execute projects and libraries; they both have imbedded keywords; both are operating system (OS) independent; they can both be synchronized with other software; commands written in both are executed line by line. However, their differences include: Java is a pure programming software while MATLAB is a hybrid software; Java is capable of creating classes, super class and sub class while MATLAB cannot; variables in java must be declared before they are initialized in Java while MATLAB automatically initializes variables; Java does not execute a line after each line of command is written while MATLAB executes commands as each line is written; debugging in Java is done line by line and errors can be corrected even after running the program while MATLAB debugs after each line and errors cannot be corrected instead, a new command is written on a new line which can be somewhat tiring with delays encountered; Java can be synchronized with the internet while MATLAB cannot.

2.2 C^{++} vs MATLAB

C^{++} is a pure programming tool/software which executes command line by line. It is a popular computer application which can be used in making analytical operations. The similarities between MATLAB and C^{++} transcript are: they are both case-sensitive; they both execute projects; they can both perform mathematical operations; commands are executed line by line; they can both be used in real time simulation. The difference between MATLAB and C^{++} transcript are: C^{++} is not object-oriented while MATLAB is object-oriented; C^{++} is a pure programming software while MATLAB is a hybrid programming software; errors found after debugging in C^{++} can be corrected in each line while errors in MATLAB cannot be corrected in each line but a new code is written on a new line; C^{++} codes have to be run before each command is executed while MATLAB executes commands and operation after each

line; variables are declared before they are initialized in C^{++} while MATLAB initializes variables automatically; mathematical expressions cannot be expanded using C^{++} while mathematical operations such as polynomial equations can be expanded using MATLAB; C^{++} cannot be synchronized with other computer software while MATLAB can synchronize with computer software.

2.3 R vs MATLAB

R is a programming language and software for statistical computation and graphics. It is multi-paradigm and is objected oriented. It was develop by Ross Ihaka and Robert Gentleman by R Development Core Team. It was first implemented in 1993 and it has dynamic typing pattern. It uses its own documentation format; LaTeX. It supports matrix arithmetic method just like MATLAB. MATLAB possess a higher productivity analysis compared to R. MATLAB is field-proven by engineers all over the world. MATLAB makes use of simple language and syntax making it easier to understand by beginners. MATLAB has a better or proffers an extensive mathematical function compared to R. MATLAB IDE is enhanced and efficient for data processing and analytics. MATLAB toolboxes include highly enhanced function libraries and so on. MATLAB is 5-130 times faster than R when run in statistical mode and MATLAB also has tools that IT professionals need to enhance their analytical models in which R does not support.

3.0 COMPARATIVE ROLES OF MATLAB AND MATHEMATICAL PACKAGES

There are various mathematical packages used in mathematics, sciences and engineering. Octave is a computer program for performing numerical computations which is mostly compatible with MATLAB It is part of the GNU Project. It is free software under the terms of the GNU General Public. R is a free software environment for statistical computing and graphics. It is a GNU project which is similar to the S language and environment which was developed at Bell Laboratories. Sage is a free open-source mathematics software system licensed under the GPL. It combines the power of many existing open-source packages into a common Python-based interface. Scilab is a scientific software package for numerical computations providing a powerful open computing environment for engineering and scientific applications. Python(x, y) is a free scientific and engineering development software for numerical computations, data analysis and data visualization based on Python programming language. SMath Studio is a math program with 'paper'-like interface and numerous computing features. It has an ability to work with systems, matrices, vectors, complex numbers, infinities and fractions. Mathcad is engineering calculation software that drives innovation and offers significant process productivity advantages for product development and engineering design projects. FreeMat is an environment for rapid engineering and scientific processing. It is similar to commercial systems such as MATLAB from Mathworks and IDL from Research Systems, but is Open Source. COMSOL Multiphysics is an engineering, design, and finite element analysis software environment for the modeling and simulation of any physics-based system.

3.1 Mathcad vs MATLAB

Mathcad is an interactive hybrid software used in performing mathematical operations. It is compatible with most system software and is used in operating special formulae. The similarities between MATLAB and Mathcad are: they are both used for performing mathematical operations; they both initialize variables automatically; they both execute commands after each line; they are both OS independent; they are both hybrid software. The differences between MATLAB and Mathcad are: Mathcad outputs solutions at the same line while MATLAB outputs solution at after each line; mathematical expressions cannot be expanded using Mathcad while mathematical operations such as polynomial equations can be expanded using MATLAB; Mathcad is not case-sensitive while MATLAB is case-sensitive; Mathcad displays mathematical operators like square roots while MATLAB uses keywords and symbols to represent them; Mathcad plots graphs in the same window with the worksheet while MATLAB plots graph in a different window; errors found after debugging in Mathcad can be corrected in each line while errors in MATLAB cannot be corrected in each line but a new code is written in a new line; Mathcad cannot be used in real time simulation while MATLAB can perform real time simulations.

3.2 GNU Octave vs MATLAB

GNU Octave is a mathematical software which is similar to MATLAB. The similarities between MATLAB and GNU Octave are: they are both case-sensitive; they both execute projects; they can both perform mathematical operations; commands are executed line by line; they both have matrices as fundamental data type; extensibility in the form of user-defined functions. The differences between MATLAB and GNU Octave are: MATLAB unlike octave uses C-type programming language; single and double quotes can be used in GNU Octave while MATLAB supports only single quotes; MATLAB always uses '…' in line continuations while GNU Octave can expect the use of commas or \ in line continuation; MATLAB can call up a file 'startup.m' from its directory while Octave will call up and execute a file named '.octaverc' which can be edited to be similar to MATLAB's 'startup.m' file; to end loops or blocks formed by keywords like 'if' or 'for', Octave uses 'endif', 'endfor', etc. while MATLAB uses 'end' statement; to create a 2 by 4 matrix Octave uses the command 'abc' or 'abc '.

3.3 ANSYS vs MATLAB

ANSYS is a simulation software used in optimizing devices and displaying dynamic physical phenomenon. The similarities between MATLAB and ANSYS are: they are both OS independent; they are both hybrid software; they can both be used in real time simulation; they can both be synchronized with other software; they are both object oriented; they both use C-type programming language. The differences between MATLAB and ANSYS are: graphs and simulations in ANSYS are outputted in the same window while MATLAB outputs graphs and simulations in a different window; mathematical expressions cannot be expanded using Mathcad while mathematical operations such as polynomial equations can be expanded using MATLAB; ANSYS does not perform mathematical operations while MATLAB

performs mathematical operations; the graph or image produced in ANSYS can be manipulated directly with a mouse while in MATLAB parameters are changed and written in other to be effected in the graph or image.

3.4 PYTON vs MATLAB

Python is a programming language. It is commonly used with C also known as CPython. Excluding the programming language and the interpreter, it consists of a standard library. The aim of the library is for programming in general and it also contains modules for networking, database, etc. Most of the python programmers come from using a Linux environment and they use a python shell and an editor, but the programmers that use Matlab prefer the IDE feature. Python is free and open, thereby making it easy for people to create packages and software. It is also possible to design software using any of the major GUI libraries; example is Qt, Open GL. A different example is Cython. Cython increases or enhances the speed of the algorithms. It does this by converting python to C codes. Python is another high-level language and when seen it looks very similar to the MATLAB software: it is interpretable, has a quick interactive interface, allows dynamic typing, provides automatic memory management and it comes with complex numbers that are inbuilt. Python is the focus of this paper because it has or provides several advantages over MATLAB in teaching: (i) It has a very clear, unmistakable and spontaneous syntax and uses serration in the classification of blocks of statements. (ii) Python has very little core of commands which make available almost all the functionality for beginners for easy access and understanding of the required styles of coding. It is good to take to note that although Python has been in for just about 10 years, it is a comparatively stable language and used more and more in industry and academia including very big organizations. It also makes it possible to provide the framework for creating and running large modularized codes.

3.5 Scilab vs MATLAB

Scilab is a numerical computational package, high level, open source, numerically oriented programming language. It is used in signal processing, image enhancing, fluid dynamics simulations and other functions. Scilab is one of the two major open-source software, the other being Matlab. It is also similar to GNU Octave. It is a high level language that uses matrix based computation. Scilab does not present the user a highly interactive environment to work with. When it is loaded with Linux the GUI is even far less. It includes only the command window and there is no command history available. Scilab help is very poor. The examples that it provides are not satisfactory. Help documents are not available in PDF. It does not have a getting started link for beginners. Unlike Matlab, Scilab package do not have an image processing toolbox but have a signal image processing toolbox that can be downloaded freely. The standard Scilab package comes with many of the essential functions used for the study of control systems. Although, it lacks a separate control system toolbox, it does not contain functions such as “if” and “impulse” which are commonly used in this field of study. Also, some functions have a slightly different syntax in comparison to Matlab. 1. The syntax of SCILAB is similar to MATLAB, because it is largely dependent on

the MATLAB format. The easiest way to carry out a SCILAB code is by typing in the prompt, ~ , in the command window. This program can be used as an interactive math's interface. Functions are not looked at as file extensions such as MATLAB m-files, but as variables in the SCILAB environment. A user function can be called as a single file, and the name of the file is needed in order to trace these functions. The graphical plotting of the SCILAB and MATLAB are the same but the syntaxes are a little bit different in the sense that functional plots that are essential can be produced the same way.

3.6 Maple vs MATLAB

Maple is a computer algebra system. Maple can perform the following operations: analytic work, solve formulae and calculus, solve linear algebra with expressions, carryout integration, perform Laplace and Fourier transforms, statistical analyses and process control. The similarities between Maple and Matlab operations include: both systems have the ability to plot data in 2-D and 3-D, both support building GUIs for routine tasks, both are interactive.i.e. one can enter statements and have them executed within the same environment. The syntax for maple is a bit different from Matlab. In maple, there's the usual assignment of a variable to a value using 'colon equal' and for Matlab it is 'equal'. Every line in Maple must terminate with a "semicolon." While in Matlab, no extra syntax is necessary to terminate a function; once a semicolon is included, the output will be suppressed. For maple, routine tasks are saved in worksheets. For Matlab, we use script files and functions. Maple as we know is known for symbolic capability. Unlike maple, the symbolic capability is available to Matlab when symbolic math toolbox has been installed on it.

4.0 CONCLUSION

The comparative advantages and limitations of some mathematical software were reviewed. The study provides for science oriented individuals, the option of defining what tools are needed per time for analyzing data. With the highlighted merits and demerits of the shortlisted software for this paper, it however becomes an easy task to source for apt software relevant for definite or specific functions. Furthermore, no single software can carry out all the mathematical needs identified in different projects. Hence, all that then matters is to have a broad understanding of the capabilities of the available options and how user-friendly they are. A software, is job-specific i.e. its ability is constrained by its capacity. Its action can be likened to that of an enzyme or a catalyst since it is designed to carry out specific operations and help speedup processes / mathematical operations that should have ordinarily taken a longer time to complete.

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REFERENCE

1. Drijvers, P. and Trouche, L. (2007). From artifacts to instruments-a theoretical framework behind the orchestra metaphor. In Blume, G. W. and Heid, M. K., editors, *Research on Technology in the Learning and Teaching of mathematics:Syntheses and Perspectives*. Kluwer Academic Publishers, Dordrecht.
2. Emetere, M.E.,. (2014). Profiling Laser Induced Temperature Fields for Superconducting Materials Using Mathematical Experimentation. Journal of Thermophysics and Heat Transfer 28(4), pp. 700-707 (doi: 10.2514/1.T4407)
3. Emetere, M.E., (2014) Presence Of Pseudo-Path In The Inter-Plane Penetration Depth Of Layered YBa2Cu3Oy,Journal of Superconductivity and Novel Magnetism 27(12).DOI 10.1007/s10948-014-2939-8
4. Emetere, M.E., & Uno, U.E., (2015a). Fast Fourier Computational Analysis ofthe Optical Properties of Lead Sulphide Thin Film, Advanced Studies in Theoretical Physics, 9(6), pp. 263-272.
5. Emetere, M.E., Uno, U.E. & Akinyemi M.L, (2015b). Modeling ground temperatures profile for future environmental investigations. Advanced Studies in Theoretical Physics. 9 (10), pp. 449-459
6. Emetere, M.E., Akinyemi M.L., & Akin-Ojo O., (2015c) Aerosol Optical Depth Trends over Different Regions of Nigeria: Thirteen years Analysis, Modern Applied Science. 9 (9), p267-279
7. Emetere M.E., Akinyemi M.L., & Akinojo O., (2015d) Parametric retrieval model for estimating aerosol size distribution via the AERONET, LAGOS station, Elsevier: Environmental Pollution, 207 (C), 381-390
8. Fuglestad, A. B. (2005). Students' use of ICT tools in mathematics and reasons for their choices. (In) Chick, H. L. and Vincent, J. L., editors, *Proceedings of the 29th Conference of the International Group for the Psychology of Mathematics Education*, Melbourne. University of Melbourne. 3:1-8,
9. Hohenwarter, M. (2002). *GeoGebra-Ein Softwaresystem f¨ur dynamische Geometrie und Algebra der Ebene*. Master's thesis, University of Salzburg,Salzburg. Pp 1-265
10. Straber, R. (2002). Research on dynamic geometry software-An introduction. *The International Journal on Mathematics Education*, 34(3):65.
11. Leuders et al., 2005 Leuders, T., Barzel, B., and Hubmann, S. (2005). *Computer, Internet und co im Mathematikunterricht*. Cornelsen, Berlin.
12. Key Curriculum Press (2008). The Geometer's Sketchpad. Dynamic geometry software. Key Curriculum Press.
13. Graumann et al., (1996) Graumann, G., H¨olzl, R., Krainer, K., Neubrand, M., and Struve,H. (1996). Tendenzen der Geometriedidaktik der letzten 20 Jahre. *Journal f¨ur Mathematikdidaktik*, 17(3/4):163-237.
14. Friedlander, A. (1998). An Excellent Bridge To Algebra. *Mathematics Teacher*, 91(50):382-383.
15. Ozgun-Koca, S. A. (2000). Using Spreadsheets In Mathematics Education. Retrieved February 23, 2008, from http://www.ericdigests.org/2003-1/math.htm.