

Software Application In Under Graduate Electrical Engineering Education

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Abstract

No doubt, the practical examples are must important for electrical engineering under graduate students, but the software programs can provide an additional support to teachers in class room for better and easy learning. There are various software these can be used for learning the various electrical engineering subjects like circuit theory, control system, power system, power electronics and drive etc. In all the sector of engineering i.e. power plants, distribution substation also in industry various monitoring is done by with the help of computer. All the designs of distribution system and electrical machines, house and building winding is prepared by computer software. So there is an important role of software in real life engineering. It is very important to educate the future engineers with the help of software for their better carrier and better understanding. This paper provides a help to the students and faculty member also for finding the better applications in classroom teaching with the help of use of software.

Index terms - Electrical engineering software, electrical, engineering, education, software application

1. Introduction

As the software has grown in popularity, its usage in the educational field has become an important preoccupation for more and more universities all over the world. In electrical engineering, software environments like MATLAB and Psim have now the potential to enhance the content of a large variety of courses, offering teachers the opportunity to develop new educational. By integrating PCs and commercial technologies, the virtual instrumentation approach is ideal to implement software-based versions of the real-world instruments, increasing the versatility of the existing hardware with minimal cost [1-3]. This, in combination with the intuitive

nature of the dataflow programming, allows educators to create a richer learning environment that greatly facilitates the hands-on experimentation. Likewise, the students may develop their own applications without needing extensive knowledge of programming techniques, often associated with text-based engineering software. Thus, they will be able to focus on exploring concepts and solving engineering problems, rather than learning programming nuances.[4-5]

2. popular software tools for electrical engineering

A number of software tools available for electrical engineer. There a description on software is present which are easily available and can be download from website as a student version at free of cost.

2.1 labVIEW

LabVIEW is system design software that provides engineers and scientists with the tools needed to create and deploy measurement and control systems through unprecedented hardware integration. LabVIEW inspires you to solve problems, accelerates your productivity, and gives you the confidence to continually innovate. Student version is available of labVIEW on website [6]

2.2 MATLAB / SIMULINK

MATLAB® is a high-level language and interactive environment for numerical computation, visualization, and programming. Using MATLAB, you can analyze data, develop algorithms, and create models and applications. The language, tools, and built-in math functions enable you to explore multiple approaches and reach a solution faster than with spreadsheets or traditional programming languages, such as C/C++ or Java™. You can use MATLAB for a range of applications, including signal processing and

communications, image and video processing, control systems, test and measurement, computational finance, and computational biology. More than a million engineers and scientists in industry and academia use MATLAB, the language of technical computing. MATLAB is the foundation for all products, including Simulink®. You can extend MATLAB with add-on products for: Parallel Computing ; Math, Statistics, and Optimization ; Control System Design and Analysis ; Signal Processing and Communications ; Image Processing and Computer Vision ; Test & Measurement ; Computational Finance ; Computational Biology ; Code Generation ; Application Deployment ; Database Connectivity and Reporting . student version can be downloaded from the website [10] by creating an account.

2.3 PSIM

PSIM is simulation software specifically designed for power electronics and motor control. With fast simulation and friendly user interface, PSIM provides a powerful simulation environment to address your simulation needs. PSIM provides an intuitive and easy-to-use graphic user interface for schematic editing. A circuit can be easily created and edited. Extensive on-line help is available for each component. To handle large systems, PSIM provides the subcircuit function which allows part of a circuit to be represented by a subcircuit block. PSIM simulator is the engine of the simulation environment. It uses efficient algorithms to overcome the convergence problem and long simulation time existing in many other simulation software. The fast simulation allows repetitive simulation runs and significantly shortens the design cycle. Simulation results are displayed and evaluated in Simview. Various waveform processing functions, such as multiple screens and life styles, are provided. Post-processing functions such as addition/subtraction and average/rms value calculation are also provided. Below shows a screenshot of the Simview environment. The image shows Simview results for a VSI motor drive system. Demo version and student version of psim is available on website. it can be downloaded from the website link. [7]

2.4 PSPICE

SPICE (Simulation Program for Integrated Circuits Emphasis) is a general purpose analog circuit simulator that is used to verify circuit designs and to predict the circuit behavior. PSpice is a PC version of SPICE and HSpice is a version that runs on workstations and larger computers. PSpice has analog and digital libraries of standard components (such as NAND, NOR, flip-flops, and other digital gates, op amps, etc) which makes it a useful tool for a wide range of analog and digital applications.

With help of this software following analysis can be done Non-linear DC analysis, Non-linear transient analysis, Linear AC Analysis, Noise analysis, Sensitivity analysis, Distortion analysis, Fourier analysis, Monte Carlo Analysis. Student version can be downloaded from the website [8]

2.5 TINA PRO

TINA Design Suite is a powerful yet affordable circuit simulation and PCB design software package for analyzing, designing, and real time testing of analog, digital, VHDL, MCU, and mixed electronic circuits and their PCB layouts. You can also analyze SMPS, RF, communication, and optoelectronic circuits; generate and debug MCU code using the integrated flowchart tool; and test microcontroller applications in a mixed circuit environment. A unique feature of TINA is that you can bring your circuit to life with the optional USB controlled TINALab II and LogiXplorer hardware, which turns your computer into a powerful, multifunction T&M instrument. Electrical engineers will find TINA an easy to use, high performance tool, while educators will welcome its unique features for the training environment. Student version or demo can be downloaded from the website [9] by simple registration process

2.6 CIRCUIT MAGIC

Circuit Magic is an electrical circuit's simulation program specifically designed for students teaching basics electronics, electrical laws & circuit theory. Unlike many electronic circuit analyzers, Circuit Magic can analyze circuits like a man. Circuits are simulated step by step, using natural solving strategy. With Circuit Magic's easy to use Schematics editor you can construct electrical circuit schematics consisting of direct and alternating currents devices such as resistors, capacitors, inductors, impedances, DC voltage sources, DC current sources, AC voltage sources, AC current sources. Circuit Magic's advanced analysis capabilities, allow you to analyze basic electronic circuits using Kirchhoff's Laws, Node Voltage & Mesh Currents methods. Easy to use electrical schematics editor, helping to make an easy task of circuit design Circuit simulation capability to perform Alternating/Direct currents analysis using Kirchhoff's current and voltage laws, node voltage and mesh current method this software can be downloaded from the website as a demo version [11]

2.7 Electrical CADD

CADD Centre offers courses for electrical engineering students using the intelligent electrical design software PC Schematic Automation. The course has been designed to enable participants to

create schematics for electrical wiring diagrams, control circuit diagrams, pneumatics and hydraulics. The Professional and Master Diploma courses offered imparts project management tools such as Microsoft Project and Primavera combined with Project management concepts. this software can be downloaded from the website as a demo version [12] for this software student need a preface id.

2.8 AutoCAD ELECTRICAL

AutoCAD® Electrical software is the AutoCAD® software for electrical controls designers. Created for electrical control systems, AutoCAD Electrical design software includes all the functionality of AutoCAD plus a complete set of electrical CAD features. Comprehensive symbol libraries and tools for automating electrical design tasks help to save hours of effort, so electrical engineers can spend more time innovating. free trial or demo version can be downloaded from the website [13]

2.9 ETAP Analysis Software

ETAP offers a wide range of network analysis applications for electrical engineering. Modules are available to analyze generation plants, large industrial facilities, transmission systems, distribution systems as well as small commercial facilities.

ETAP Software can be used offline for power system simulation, online for real-time data management, or used to control real time systems. ETAP is customizable; enabling clients to utilize the portions of the application they require without having to purchase the entire package.

This software is used for Arc Flash Analysis, Power System Analysis, Wind Turbine Modeling/Analysis (Renewable Energy). Demo version of this software is available at website [14]

3. Conclusions

The presented paper has taken into account the authors' experience, results reported in literature by other authors and specific documents offered by software vendors. Thus, based on these data, we can conclude that: the software packages and their add-ons are now great tools for teaching and learning electrical engineering concepts within the university courses;

4. References

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[8]<http://www.electronicslab.com/downloads/schematic/013/>

[9]<http://www.tina.com/English/tina/downloaddemo&PrID=tina>

[10]https://www.mathworks.com/accesslogin/login.do?uri=http%3A%2F%2Fwww.mathworks.in%2Fdownloads%2Fstudent_downloads%2Findex

[11] <http://www.circuit-magic.com/screens.htm>

[12] <http://www.caddcentre.ws/registration.php>

[13] <http://usa.autodesk.com/autocad-electrical/>

[14] <http://etap.com/demo-section/demo-download.aspx>