

MATLAB BASED FAULT ANALYSIS TOOLBOX FOR ELECTRICAL POWER SYSTEM

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ABSTRACT

This paper has developed a Matlab based GUI tool for fault analysis for power systems students at under graduate level. This is not a technically rich paper, however, this type of tool box will help student to get a better idea while studying the theory. The notations used in the program are mostly compatible with the formats used in electrical power system textbooks. The program is developed under MATLAB 6.5 and is tested to work perfectly in the recent release of MATLAB 7.0. The toolbox uses the user friendly Graphical User Interface (GUI).

Keywords: *Power System faults, MATLAB, GUI.*

1. INTRODUCTION

Traditional tools for power system fault analysis such as PSS/E [1], Eurostag [2], and PSAPAC [3], require coding in the conventional programming languages. Now-a-days, MATLAB has become the standard tools for technical computing. A number of papers addressed the issue of power system analysis in MATLAB [4], [5], and [6]. There also exist a block set named 'SimPowerSystems' in MATLAB. It targets the three phase power system simulation. For a new user it requires knowledge about (a) how to build and simulate electrical circuits using the powerlib library (b) how to interface an electrical circuit with Simulink blocks (c) how to analyze the steady-state and frequency response of an electrical circuit. These programs are mostly intended to professionals or are too hard for a student to catch those. These programs take detailed input data about the system, use fast algorithms to perform the solutions, and then present the results obtained. Such software is most useful when only the final results are sufficient for the user not when the students learning a power system course for the very first time.

Professional software for analysis fault on electric power systems can help such students to prove their solutions; however, only the validity of the final results can be checked. Also, such software requires some detailed input parameters to which power system students have not yet been introduced.

The toolbox presented in this paper is devoted to the students not only to help them solving their class room problems but also to help them understanding the theory behind. It helps them to visualize the effect of change of parameters by providing an attractive Graphical User Interface (GUI).

This toolbox is developed in such a manner that the problems can be solved in the same way as they are in most popular and well established textbooks [7], [8], [9], [10], [11] and [12]. The solutions are obtained in the same way as they are presented and displayed so that all the steps can be followed and visualized.

The program has been developed under MATLAB for Windows application. This approach enabled the use of graphical controls and use of MATLAB's built-in functions. As the m-files written for MATLAB are not compiled into binary form, students are also able to see the inner structure of the program and have the chance to see how the electric power system analyses are implemented on a computer.

2. TOOLBOX ENVIRONMENT

This toolbox occupies about 15 Mbytes of hard disc space after the host software is installed on the system. It uses a GUI environment. It runs from a main shell that refers to required sub-programs by means of graphical menus.