

# MATLAB/SIMULINK Simulation Tool for Power Systems

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**Abstract** - This paper describes the modeling and simulation library for power systems simulation under SIMULINK environment. The different features of MATLAB Toolboxes used in the analysis of power systems are described. Software introduces SIMULINK environment of MATLAB for implementing user friendly and linear expansion. To illustrate the capabilities of SIMULINK simulation tool, a case study based on a test system is presented.

**Keywords** - Modeling, Protective relaying, Power System Blockset

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## I. INTRODUCTION

A product of The MathWorks, Inc. MATLAB started life as a program designed to perform matrix mathematics, but over the years it has grown into a flexible computing system capable of solving essentially any technical problem. MATLAB can manipulate and invert large matrices and can be used in many numerical applications. MATLAB's capabilities can be extended with addition called SIMULINK, a program which is normally used in the analysis and synthesis of modern systems.

SIMULINK, now incorporated into MATLAB, can also be used to analyze and design of power systems. During last four decade's simulation of power systems have gained more importance. Recently published IEEE paper discussing different approaches to modeling protective relays and related power system events indicates a variety of possible software tools that may be used for this purpose [1]. But rather than MATLAB/SIMULINK software it is difficult to add the modeling and simulation features to such specific protective relaying concepts that go beyond the level of detail originally provided by the software. The MATLAB software package with SIMULINK support and Power System Blockset (PSB) [2, 3] is utilized to develop customized model libraries for teaching protective relaying concepts.

In this paper the section II describes the reasons for using MATLAB compared with EMTP/ATP, section III

describes features of MATLAB toolboxes; section IV focused on block libraries of Power System Blockset and section V describes a case study.

## II. MATLAB DE-FACTO STANDARD

When we compare MATLAB/SIMULINK with EMTP/ATP, we will see which one is better for the power systems simulation. The following items summarize the most important differences in protection systems simulation [4].

1. The EMTP/ATP is specific software to simulate power system transient problem, whereas the MATLAB/SIMULINK can be used to simulate power system faults and protective relay algorithm at the same time.
2. ATP/EMTP is designed to simulate the physical processes of transmission lines and transformers quickly and in a convenient way, but MATLAB/SIMULINK offers more possibilities in power electronics, signal processing and control.
3. Users can easily create new relay model with MATLAB/SIMULINK, whereas EMTP/ATP doesn't have such capacity.
4. MATLAB/SIMULINK encompasses better graphic function tools than EMTP/ATP of popups, plots and so on.

Therefore, for automatic interactive systems MATLAB/SIMULINK is selected.

# Matlab Simulink Simulation Tool For Power Systems

**Xiaolong Qi**



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