CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

System identification is the process of formulating a mathematical model of a system using examined data. Modelling is an essentially important way of analysing, learning and understanding the world around. All system in the world usually used model system as the simulation for the real system. One of the common model is Hammerstein Model.

The Hammerstein Model represented the series connection of static nonlinear system with linear system. Among various type of nonlinear system model, Hammerstein model is the most popular ones. It is an important block-oriented structure which from combination of simple of linear system with the general of nonlinear system. In this era of technology, there are many of solution has been proposed to identify the Hammerstein model.

In order to find the approximation parameter for Hammerstein Model, SPSA has been studied as a proper solution. SPSA known as Simultaneous Perturbation Stochastic Approximation will be used to solve the unknown parameter for Hammerstein Model.
1.2 PROBLEM STATEMENT

A variety of method has been proposed to estimate the parameter for Hammerstein model. Most of existing results discuss the models in discrete time, while the many of actual system are represented naturally in continuous time. In addition, the existing methods assume that the static nonlinear system can be presented by a linear combination of several numbers of known basic functions.

1.3 PROJECT OBJECTIVE

The main objective of this project is to estimate the parameter in Hammerstein model based on the given input and output data using Simultaneous Perturbation Stochastic Approximation (SPSA) method. Besides that, objective of this project is to analyse the efficient of the SPSA in identify nonlinear system in term of object function and error with different noise variance.

1.4 SCOPE OF THE PROJECT

This project covered overall estimation the parameter of both the linear and nonlinear parts in the Hammerstein model by using Simultaneous Perturbation Stochastic Approximation (SPSA) with MATLAB simulation. We use the SPSA method as a tool for identification system in nonlinear system part. While the non-linear part using piecewise approximation. The SPSA-based method will be utilized to identify the parameter in both linear and nonlinear subsystems based on the given input and output.
1.5  THESIS LAYOUT

This thesis discussed on how identification method using simultaneous perturbation stochastic approximation solved the Hammerstein system. It cover on five main chapters. Chapter 1 is discussed on the introduction of this project where the problem statement and the objective of project are stated. Next, chapter 2 described on the literature review that included on the research that had been done through the journal of the previous researcher. The main parts of this chapter are the method of identification for Hammerstein and the simulation by MATLAB. Chapter 3 discussed on the procedure of this project which it involved on the mathematical modelling and the coding has been simulated. For the chapter 4, all the results and discussion has been analysed and discussed. Finally, Chapter 5