

**MODELING AND SIMULATION THE TRANSIENT STABILITY
ANALYSIS OF THE STEAM TURBINE GOVERNOR
MODEL (TGOV1) USING DCPS**

This thesis is presented in partial fulfillment for the award of the Bachelor of
Electrical Engineering (Honours)
UNIVERSITI TEKNOLOGI MARA
MALAYSIA



MOHD HAKIMAN HAFIZ BIN GHANI

**FACULTY OF ELECTRICAL ENGINEERING
40450 SHAH ALAM, MALAYSIA
MAY 2009**

ABSTRACT

This project presents the modeling of steam turbine governor model (TGOV1) and analyze the transient stability of the governor using DCPS when the disturbance occur at the power system. The six bus test system was used to analyze transient stability. These study concentrates on modeling the block diagram of governor model TGOV1, suitable the parameter of TGOV1 and write the DCPS program to analysis transient stability.

ACKNOWLEDGEMENT

In the name of Allah (S.W.T) the Most Gracious and the Most Merciful. Firstly, I would like to express my gratitude to Allah (S.W.T) for blessing me the strength and good opportunity to complete this project. Next, I would like to express my thank to my supervisor, Mr. Norazlan Bin Hashim for her kindness, comment, correction and suggestion to me to proceed with my work in this project. If not for support as well as her guidance to ensure that my project is success. I feel it might be quiet difficult for me to complete this project. Without her advices and valuable assistance this project can never be complete.

This project was made possible by the efforts and talents of many people. To my seniors thank for helping me, giving me information and share idea for my project. To my friends thank for giving their hard work and contribution in giving ideas and support such as leading us their personal computer. Not forgetting my parent, I want to thank them a lot of for moral support and the most important thing to provide me with my financial support. Without them, maybe this project may not be successfully completed in the requirement date line.

From beneath my heart, I really appreciated the thing that all of you have done for me throughout the period that I have taken in term of trying to complete my project. Finally, to those who make this project possible. Thank you very much and may Gog bless all of you.

TABLE OF CONTENT

DECLARATION.....	i
ABSTRACT.....	ii
ACKNOWLEDGEMENT.....	iii
TABLE OF CONTENTS.....	iv
LIST OF FIGURE.....	vii
LIST OF TABLE.....	x

INTRODUCTION

1.1	Introduction	1
1.2	Objective	3
1.3	Scope of Work.....	4
1.4	Organization of Thesis	5

BACKGROUND STUDY

2.1	Introduction	6
2.2	Basic Governing Scheme.	6
2.3	Speed control.....	9
2.4	Power System Stability	9
2.4.1	Voltage Stability	10
2.4.2	Rotor Angle Stability	11
2.4.3	Transient Stability	11
2.4.4	Synchronous Machine.....	12
2.4.5	Synchronous Machine Structures	12

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Power system stability refers to the ability of synchronous machine to move from steady-state operating point without losing synchronism [6]. Transient stability, the main focus of this paper, involves major disturbance, such as fault and sudden load changes. During normal operation in electric power generation facilities, a governing control system regulates the steam flow to the turbine to balance the generator load and other mechanical losses so that there is no net torque on the rotor and speed remains constant. A sudden loss of generator load can result in a high net torque on the rotor. Uncontrolled acceleration can compromise the integrity of the turbine due to the high centrifugal stress in the rotor. At elevated speeds, there is a greater risk of steam turbine disk rupture leading to high-speed missile generation.

The DCPS program is the one technique to simulate the transient stability and algorithm of the power system stabilizer (PSS). These DCPS programs have developed by Sallehudin b. Yusof. BSc(Southampton), MEE (UTM, Malaysia) in 1993. A simulation program having three major applications that is load flow (LF), coherency grouping (CG) and transient stability (Ts) has been introduced. The DCPS is able to handle systems up to 1000 buses and 2500 generator and the capability for easy extension. [5]

Governing system is an important control system in the power plant as it regulates turbine speed, power and participates in the grid frequency regulation. For starting, loading governor system is the main operator interface. The function of governor is actually to control the opening of the steam valves. [1] A steam turbine converts stored energy of high pressure and high temperature steam into rotating energy, which converted into electric energy by the generator. The heat source for boiler supplying the steam may be a nuclear reactor or the furnace fired by the fossil fuel (coal, oil or gas).