IDENTIFICATION OF ELECTROMECHANICAL OSCILLATIONS USING SMALL - SIGNAL STABILITY ASSESSMENT: A CASE STUDY OF LAKVIJAYA POWER STATION

Athwel Gamaethiralalage Madhawa Nadunmal

(149314B)

Degree of Master of Science

Department of Electrical Engineering

University of Moratuwa

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree Master of Science in Electrical Installation

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Master thesis under my supervision.

Signature of the supervisor:

Dr. W. D. Prasad Date:

DEDICATION

This work is dedicated to my beloved parents, my darling wife, Shanika Yashodha and my two daughters.

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Abstract

Lakvijaya power plant is the biggest power plant in Sri Lanka contributing more than 50% of power annually to the national grid. The main objective of this thesis is to study of the electromechanical oscillations of Lakvijaya Power Plant using small-signal stability assessment.

Small signal stability problem refers to the stability problems caused by small disturbances. For small-signal stability studies, the power system can be represented as a linearized state space model. An algorithm is developed in MATLAB using detailed models of synchronous generators, transmission lines and the associated controls. The eigenvalues and eigenvectors of the dynamic state matrix are obtained to study small signal stability. The mode shape calculation is used to identify the dominant oscillations in the system.

Keywords: Eigen-value calculation, Small Signal Stability Analysis, Mode Shapes, Participation Factors, Thermal Plant

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List of Abbreviations

Abbreviation	Description
CEB	Ceylon Electricity Board
LVPS	Lakvijaya Power Station
VS	Voltage Source
Equ	Equation