



CONTENTS

APPROVAL PAGE	ii
STATEMENT	iii
PAGE OF DEDICATION	iv
PREFACE	v
CONTENTS	vi
LIST OF TABLES.....	ix
LIST OF FIGURES	x
NOMENCLATURES AND ABBREVIATIONS	xiii
INTISARI.....	xiv
ABSTRACT	xv
CHAPTER I Introduction	1
1.1 Background Study	1
1.2 Problem Formulation	2
1.3 Aim of The Study	2
1.4 Research Limitations	3
1.5 Benefits The of Study	3
1.6 Systematics of Writing	3
CHAPTER II Literature Review and Basic Theories	5
2.1 Literature Review	5
2.1.1 The Precedented & Related Works	5
2.1.1.1 DMD for Inertia Estimation on SGs Based On After Fault Oscillation PMU Data.....	5
2.1.1.2 DMD for Coherency Identification Between SGs.....	7
2.1.1.3 DMD for Small-Signal Stability Analysis.....	8
2.1.1.4 SINDy for Identification of SG's Parameters.....	10
2.1.1.5 Excitation Control of a SG with MPC	12
2.1.2 Conclusion	13
2.2 Basic Theories	13
2.2.1 Synchronous Generator Two-Axis Model	13
2.2.2 Single-Machine Infinite Bus	16
2.2.3 Dynamic Mode Decomposition	16
2.2.4 Multi-Channel Linear Extended State Observer.....	18
2.2.5 Sparse Identification of Nonlinear Dynamic	20
2.2.6 Model Predictive Control	22
2.3 Methodology Comparison	23
CHAPTER III Research Methodology	25



3.1	Tools and Materials	25
3.2	SG-Power Network Construction and Disturbance Schemes	25
3.2.1	Small-Scale Disturbance.....	26
3.2.2	Large-Scale Disturbance.....	26
3.3	DMDc Construction	26
3.4	SINDy Construction	27
3.4.1	Two-Step SINDy Identification	27
3.5	Evaluation of The Identified Model	29
3.5.1	Function for Evaluating DMDc	30
3.5.2	Function for Evaluating SINDy	31
3.6	SINDy-MPC and DMDc-MPC Construction.....	31
3.7	Thesis Flow	33
CHAPTER IV Results and Discussion		36
4.1	Model Identification Results	36
4.1.1	Exact-DMDc Identification Result	36
4.1.2	SINDy Identification Result	37
4.2	The Data-Driven Model Validation	39
4.2.1	Model Performance Under Small Disturbance	39
4.2.1.1	Exact-DMDc Model Performance	39
4.2.1.2	ROM-DMDc Model Performance Without Multi-Channel LESO	39
4.2.1.3	ROM-DMDc Model Performance With Multi-Channel LESO	41
4.2.1.4	SINDy Model Performance	42
4.2.2	Model Performance Under Large Disturbance	43
4.2.2.1	Exact-DMDc Model Performance Without Multi-Channel LESO	43
4.2.2.2	Exact-DMDc Performance With Multi-Channel LESO .	45
4.2.2.3	ROM-DMDc Performance Without Multi-Channel LESO	46
4.2.2.4	ROM-DMDc Performance With Multi-Channel LESO .	47
4.2.2.5	SINDy Model Performance	48
4.3	The Data-Driven MPC Examination dan Comparison	49
4.3.1	The Data-Driven MPC Performance Under Small Disturbance	50
4.3.1.1	Without Noisy Measurement.....	50
4.3.1.2	With Noisy Measurement	52
4.3.2	The Data-Driven MPC Performance Under Large Disturbance	55
4.3.2.1	Without Noisy Measurement.....	55
4.3.2.2	With Noisy Measurement	57
CHAPTER V Conclusion and Suggestion		61



5.1 Conclusion	61
5.2 Suggestion.....	61
REFERENCES	63