

1. Record Nr.	UNINA9910821671903321
Autore	Fan Lingling
Titolo	Modeling and analysis of doubly fed induction generator wind energy systems // Lingling Fan and Zhixin Miao
Pubbl/distr/stampa	Amsterdam, [Netherlands] : , : Academic Press, , 2015 ©2015
ISBN	0-12-802969-2
Edizione	[1st edition]
Descrizione fisica	1 online resource (154 p.)
Disciplina	621.3136
Soggetti	Induction generators - Mathematical models Induction generators - Automatic control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	""Front Cover""; ""Modeling and Analysis of Doubly Fed Induction Generator Wind Energy Systems""; ""Copyright""; ""Dedication""; ""Chapter 1: Introduction""; ""1.1 Wind Energy Integration Issues""; ""1.2 Objectives of This Book""; ""1.3 Structure of the Book""; ""References""; ""Chapter 2: AC Machine Modeling""; ""2.1 Space Vector and Complex Vector Explanation""; ""2.1.1 Examples of Space Vector""; ""2.2 Derivation of an Induction Machine Modeling in Space Vector and Complex Vector""; ""2.2.1 Induction Machine Modeling in Space Vector""; ""2.2.1.1 Per Unit System"" ""2.2.2 Induction Machine Modeling in Complex Vector""""2.2.2.1 Model in Per-Unit System""; ""2.2.3 Swing Equation""; ""2.3 DFIG Modeling""; ""2.3.1 Wind Turbine Aerodynamics Model""; ""2.4 Examples""; ""2.4.1 Example 1: Free Acceleration""; ""2.4.1.1 Induction Machine Simulink Model""; ""2.4.2 Example 2: DFIG Stator Voltage Drop""; ""References""; ""Chapter 3: Modeling of Doubly Fed Induction Generation (DFIG) Converter Controls""; ""3.1 Rotor Flux-Oriented Induction Machine Control""; ""3.1.1 Torque/Flux Control""; ""3.1.2 Inner Current Control""; ""3.2 DFIG Rotor Side Converter Control"" ""3.2.1 Outer Control""""3.2.2 Inner Current Control""; ""3.2.3 Maximum Power Point Tracking""; ""3.3 GSC Control""; ""3.3.1 Outer Control""; ""3.3.2 Inner Current Control""; ""3.4 Complete DFIG Modeling Blocks""; ""3.5 Examples""; ""3.5.1 Example 1: PSCAD Simulation of a Two-Level

VSC with Sine PWM"; ""3.5.2 Example 2: DFIG Simulation"";
""References""; ""Chapter 4: Analysis of DFIG with Unbalanced Stator
Voltage""; ""4.1 Steady-State Harmonic Analysis of a DFIG""; ""4.1.1
Steady-State Equivalent Circuit of a DFIG""; ""4.1.2 Harmonic
Components in Stator and Rotor Currents""
""4.1.3 Harmonic Components and Magnitudes of Electromagnetic
Torque""""4.1.4 Example""; ""4.2 Unbalanced Stator Voltage Drop
TransientAnalysis""; ""4.3 Converter Control to Mitigate Unbalance
Effect""; ""4.3.1 Negative Sequence Compensation via GSC""; ""4.3.1.1
Drawbacks of GSC Compensation""; ""4.3.2 Negative Sequence
Compensation via RSC""; ""4.3.2.1 Dual-Sequence RSC Control"";
""4.3.2.2 Proportional Resonant RSC Control""; ""4.3.2.3 Drawbacks of
RSC Compensation""; ""References""; ""Chapter 5: State-Space Based
DFIG Wind Energy System Modeling""
""5.1 State-Space Model of a SeriesCompensated Network""""5.2 State-
Space Model of DFIG Wind Energy System""; ""5.2.1 Induction Generator
Model""; ""5.2.2 DC-Link Model""; ""5.2.3 Torsional Dynamics Model"";
""5.2.4 DFIG Converter Controls""; ""5.3 Integrated System Model"";
""5.4 Application of SSR Analysis""; ""5.4.1 Introduction""; ""5.4.2
Analysis of SSR in a DFIG""; ""5.4.3 Impact of Wind Speed and
Compensation Level on SSR""; ""5.4.4 Impact of DFIG Current
Controllers on SSR""; ""5.4.5 Results of TI Effect""; ""5.4.5.1 Impact of
Compensation Level on Torsional Mode""
""5.4.5.2 Impact of Wind Speed on TI""

Sommario/riassunto

Wind Energy Systems: Modeling, Analysis and Control with DFIG provides key information on machine/converter modelling strategies based on space vectors, complex vector, and further frequency-domain variables. It includes applications that focus on wind energy grid integration, with analysis and control explanations with examples. For those working in the field of wind energy integration examining the potential risk of stability is key, this edition looks at how wind energy is modelled, what kind of control systems are adopted, how it interacts with the grid, as well as suitable study approaches. Not only giving principles behind the dynamics of wind energy grid integration system, but also examining different strategies for analysis, such as frequency-domain-based and state-space-based approaches. Focuses on real and reactive power control Supported by PSCAD and Matlab/Simulink examples Considers the difference in control objectives between ac drive systems and grid integration systems
