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Analysis in REG and AC/DC Transmission Systems -- Impedance Modeling and Analysis for REG plant -- Analysis of Broadband Oscillation for REG Connected into HVAC System -- Analysis of Broadband Oscillation for REG Connected into HVDC System -- Broadband Oscillation Mitigation in REG and AC/DC Transmission Systems -- Oscillation Mitigation Based on Impedance Reshaping of MMC-HVDC -- Oscillation Mitigation Based on the Impedance Reshaping of SVG -- Oscillation Mitigation Based on Impedance Reshaping of LCC-HVDC -- Oscillation Mitigation Based on Impedance Reshaping of MMC-HVDC -- Project Oscillation Cases of REG and AC/DC Transmission Systems. .

Sommario/riassunto

With the growth of the installed capacity and the proportion of REG, mainly including wind power and PV power generation, the stable operation of REG and AC/DC transmission systems has become a technical bottleneck for the sustainable development of REG. Since 2009, broadband oscillation incidents have occurred frequently in REG and AC/DC transmission systems in China and some foreign countries, resulting in severe consequences such as large-scale tripping-off of REG units, damaging equipments, and an increasing curtailment of wind and PV power generation. However, there are great difficulties and challenges for the analysis and mitigation of broadband oscillation. This book focuses on the analysis and mitigation of broadband oscillation in renewable energy generation and AC/DC transmission systems. The theoretical knowledge and practical approaches to solve this issue are explored through the contents of 4 parts, 18 chapters. Part is Small-signal Modeling of Converters, containing four chapters. The frequency-domain small-signal modeling method and impedance modeling of three types of basic converters commonly used in power electronic devices, including the two-level converter, modular multilevel converter, and thyristor converter are introduced. Part is Impedance Model and Characteristics Analysis of REG and HVDC Transmission, containing six chapters. The impedance model and characteristics analysis of the full power conversion wind turbine, DFIG-based wind turbines, PV unit, SVG, LCC-HVDC, and MMC-HVDC are introduced. Part is Broadband Oscillation Analysis in REG and AC/DC Transmission Systems, containing three chapters. The impedance modeling and characteristics analysis of REG plants, and oscillation analysis of REG connected into AC and HVDC transmission systems are introduced. Part is Broadband Oscillation Mitigation in REG and AC/DC Transmission Systems, containing five chapters. The impedance reshaping of the REG unit, SVG, LCC-HVDC, and MMC-HVDC as well as project cases are presented. This book can be used by the researchers engaged in the design, technology research and development, and operation management of electrical engineering and renewable energy engineering, which can also be a reference book for teachers and students of electrical engineering in colleges and universities. This book is a translation of an original German edition. The translation was done with the help of artificial intelligence (machine translation by the service DeepL.com). A subsequent human revision was done primarily in terms of content, so that the book will read stylistically differently from a conventional translation.