1. Record Nr. UNINA9910877888503321 Autore Arrillaga J Titolo Flexible power transmission: the HVDC options // J. Arrillaga, Y.H. Liu, N.R. Watson Pubbl/distr/stampa Chichester, England; ; Hoboken, NJ, : John Wiley, c2007 **ISBN** 1-280-97398-6 9786610973989 0-470-51186-9 0-470-51185-0 Descrizione fisica 1 online resource (376 p.) Altri autori (Persone) LiuY. H WatsonN. R Disciplina 621.319/12 Soggetti Electric power transmission Electric power distribution 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 and index. Flexible Power Transmission The HVDC Options; Contents; Preface; 1 Nota di contenuto Introduction: 1.1 The Conventional Power Grid: 1.1.1 Power Transfer Mechanism; 1.2 Towards a More Flexible Power Grid; 1.2.1 Power Electronics Control: 1.3 HVDC Transmission: 1.3.1 Thyristor-Based CSC Transmission; 1.3.2 VSC Transmission Based on the Integrated Gate Bipolar Transistor (IGBT); 1.3.3 Multi-terminal HVDC; 1.3.4 The Flexibility Concept Applied to HVDC; 1.4 Relative Power Carrying Capability of AC and DC Transmission Lines; 1.5 The Impact of Distributed Generation; 1.6 The Effect of Electricity Deregulation 1.7 DiscussionReferences; 2 Semiconductor Power Devices; 2.1 Introduction; 2.2 Semiconductor Principles; 2.3 Power Semiconductor Elements; 2.3.1 The pn Rectifier; 2.3.2 The Transistor; 2.3.3 Metal-Oxide-Semiconductor Field-Effect Transistor; 2.4 Dynamic Stresses on Power Switches; 2.4.1 Rate of Change of Voltage dv/dt; 2.4.2 Rate of Change of Current di/dt; 2.4.3 Balancing Problems in Series Chains; 2.5

Other Switching Issues; 2.5.1 Switching Frequency; 2.5.2 Switching Losses; 2.5.3 Soft Switching; 2.5.4 Use of Snubbers; 2.6 Thyristor-Type

Power Switches; 2.6.1 The Thyristor

2.6.2 Gate Turn-Off Thyristor (GTO)2.6.3 Insulated Gate-Commutated Thyristor (IGCT); 2.6.4 MOS Turn-Off Thyrister (MTO); 2.6.5 MOS Controlled Thyrister (MCT); 2.6.6 Emitter Turn-Off Thyristor (ETO); 2.7 Insulated Gate Bipolar Transistor (IGBT); 2.7.1 IGBT (Series) Chains; 2.8 Diodes; 2.9 Prognostic Assessment; 2.9.1 Ratings and Applicability; 2.9.2 Relative Losses; References; 3 Line-Commutated HVDC Conversion; 3.1 Introduction; 3.2 Three-Phase AC-DC Conversion [1]; 3.2.1 Basic CSC Operating Principles; 3.2.2 Effect of Delaying the Firing Instant: 3.3 The Commutation Process 3.3.1 Analysis of the Commutation Circuit3.4 Rectifier Operation; 3.5 Inverter Operation; 3.6 Power Factor and Reactive Power; 3.7 Characteristic Harmonics [3]; 3.7.1 DC Side Harmonics; 3.7.2 AC Side Harmonics; 3.8 Multi-Pulse Conversion; 3.8.1 Transformer Phase Shifting; 3.8.2 DC Ripple Reinjection [5]; 3.9 Uncharacteristic Harmonics and Interharmonics; 3.9.1 Imperfect AC Source; 3.9.2 DC Modulation; 3.9.3 Control System Imperfections; 3.9.4 Firing Asymmetry; 3.9.5 Magnification of Low-Order Harmonics; 3.10 Harmonic Reduction by Filters; 3.10.1 AC Side Filters; 3.10.2 DC Side Filters

3.11 Frequency Cross-Modulation Across the LCC3.12 Summary; References; 4 Self-Commutating Conversion; 4.1 Introduction; 4.2 Voltage Source Conversion; 4.2.1 VSC Operating Principles; 4.2.2 Converter Components; 4.2.3 The Three-Phase VSC; 4.3 Comparison of LCC and VSC; 4.4 Current Source Conversion; 4.4.1 Analysis of the CSC Waveforms [2]; 4.5 The Reinjection Concept with Self-Commutation; 4.5.1 Application to VSC; 4.5.2 Application to CSC; 4.6 Discussion; References; 5 Pulse Width Modulation; 5.1 Introduction; 5.2 PWM Operating Principles; 5.3 Selective Harmonic Cancellation 5.4 Sinusoidal (Carrier-Based) PWM

Sommario/riassunto

The development of power semiconductors with greater ratings and improved characteristics has meant that the power industry has become more willing to develop new converter configurations. These new configurations take advantage of the higher controllability and switching frequencies of the new devices. The next few years will decide which of the proposed technologies will dominate future power transmission systems. Flexible Power Transmission is a comprehensive guide to the high voltage direct current (HVDC) options available, helping the reader to make informed decisions for desi