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Autore	Lai Loi Lei
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References; 3 Three-Phase IG Operating on a Single-Phase Power System; 3.1 Introduction; 3.2 Phase Balancing using Passive Circuit Elements; 3.2.1 Analysis of IG with Phase Converters 3.2.2 Phase Balancing Schemes 3.2.3 Case Study; 3.2.4 System Power Factor; 3.2.5 Power and Efficiency; 3.2.6 Operation with Fixed Phase Converters; 3.2.7 Summary; 3.3 Phase Balancing using the Smith Connection; 3.3.1 Three-Phase IG with the Smith Connection; 3.3.2 Performance Analysis; 3.3.3 Balanced Operation; 3.3.4 Case Study; 3.3.5 Effect of Phase Balancing Capacitances; 3.3.6 Dual-Mode Operation; 3.3.7 Summary; 3.4 Microcontroller-Based Multi-Mode Control of SMIG; 3.4.1 Phase Voltage Consideration; 3.4.2 Control System; 3.4.3 Practical Implementation; 3.4.4 Experimental Results 3.4.5 Summary 3.5 Phase Balancing using a Line Current Injection Method; 3.5.1 Circuit Connection and Operating Principle; 3.5.2 Performance Analysis; 3.5.3 Balanced Operation; 3.5.4 Case Study; 3.5.5 Summary; References; 4 Finite Element Analysis of Grid-Connected IG with the Steinmetz Connection; 4.1 Introduction; 4.2 Steinmetz Connection and Symmetrical Components Analysis; 4.3 Machine Model; 4.4 Finite Element Analysis; 4.4.1 Basic Field Equations; 4.4.2 Stator Circuit Equations; 4.4.3 Stator EMFs; 4.4.4 Rotor Circuit Model; 4.4.5 Comments on the Proposed Method; 4.5 Computational Aspects 4.6 Case Study 4.7 Summary; References; 5 SEIGs for Autonomous Power Systems; 5.1 Introduction; 5.2 Three-Phase SEIG with the Steinmetz Connection; 5.2.1 Circuit Connection and Analysis; 5.2.2 Solution Technique; 5.2.3 Capacitance Requirement; 5.2.4 Computed and Experimental Results; 5.2.5 Capacitance Requirement on Load; 5.2.6 Summary; 5.3 SEIG with Asymmetrically Connected Impedances and Excitation Capacitances; 5.3.1 Circuit Model; 5.3.2 Performance Analysis; 5.3.3 Computed and Experimental Results; 5.3.4 Modified Steinmetz Connection; 5.3.5 Simplified Steinmetz Connection; 5.3.6 Summary 5.4 Self-regulated SEIG for Single-Phase Loads

Sommario/riassunto

Distributed power generation is a technology that could help to enable efficient, renewable energy production both in the developed and developing world. It includes all use of small electric power generators, whether located on the utility system, at the site of a utility customer, or at an isolated site not connected to the power grid. Induction generator (IG) is the most commonly used and cheapest technology, compatible with renewable energy resources. Permanent magnet (PM) generators have traditionally been avoided due to high fabrication costs; however, compared with IGs they are more rel