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Nota di contenuto	DESIGN OF ROTATING ELECTRICAL MACHINES; Contents; Preface; About the Authors; Abbreviations and Symbols; 1 Principal Laws and Methods in Electrical Machine Design; 1.1 Electromagnetic Principles; 1.2 Numerical Solution; 1.3 The Most Common Principles Applied to Analytic Calculation; 1.3.1 Flux Line Diagrams; 1.3.2 Flux Diagrams for Current-Carrying Areas; 1.4 Application of the Principle of Virtual Work in the Determination of Force and Torque; 1.5 Maxwell's Stress Tensor; Radial and Tangential Stress; 1.6 Self-Inductance and Mutual Inductance; 1.7 Per Unit Values; 1.8 Phasor Diagrams Bibliography 2 Windings of Electrical Machines; 2.1 Basic Principles; 2.1.1 Salient-Pole Windings; 2.1.2 Slot Windings; 2.1.3 End Windings; 2.2 Phase Windings; 2.3 Three-Phase Integral Slot Stator Winding; 2.4 Voltage Phasor Diagram and Winding Factor; 2.5 Winding Analysis; 2.6 Short Pitching; 2.7 Current Linkage of a Slot Winding; 2.8 Poly-Phase Fractional Slot Windings; 2.9 Phase Systems and Zones of Windings; 2.9.1 Phase Systems; 2.9.2 Zones of Windings; 2.10 Symmetry Conditions; 2.10.1 Symmetrical Fractional Slot Windings; 2.11 Base

Windings

2.11.1 First-Grade Fractional Slot Base Windings 2.11.2 Second-Grade Fractional Slot Base Windings; 2.11.3 Integral Slot Base Windings; 2.12 Fractional Slot Windings; 2.12.1 Single-Layer Fractional Slot Windings; 2.12.2 Double-Layer Fractional Slot Windings; 2.13 Single- and Double-Phase Windings; 2.14 Windings Permitting a Varying Number of Poles; 2.15 Commutator Windings; 2.15.1 Lap Winding Principles; 2.15.2 Wave Winding Principles; 2.15.3 Commutator Winding Examples, Balancing Connectors; 2.15.4 AC Commutator Windings; 2.15.5 Current Linkage of the Commutator Winding and Armature Reaction 2.16 Compensating Windings and Commutating Poles 2.17 Rotor Windings of Asynchronous Machines; 2.18 Damper Windings; Bibliography; 3 Design of Magnetic Circuits; 3.1 Air Gap and its Magnetic Voltage; 3.1.1 Air Gap and Carter Factor; 3.1.2 Air Gaps of a Salient-Pole Machine; 3.1.3 Air Gap of Nonsalient-Pole Machine; 3.2 Equivalent Core Length; 3.3 Magnetic Voltage of a Tooth and a Salient Pole; 3.3.1 Magnetic Voltage of a Tooth; 3.3.2 Magnetic Voltage of a Salient Pole; 3.4 Magnetic Voltage of Stator and Rotor Yokes; 3.5 No-Load Curve, Equivalent Air Gap and Magnetizing Current of the Machine 3.6 Magnetic Materials of a Rotating Machine 3.6.1 Characteristics of Ferromagnetic Materials; 3.6.2 Losses in Iron Circuits; 3.7 Permanent Magnets in Rotating Machines; 3.7.1 History and Development of Permanent Magnets; 3.7.2 Characteristics of Permanent Magnet Materials; 3.7.3 Operating Point of a Permanent Magnet Circuit; 3.7.4 Demagnetization of Permanent Magnets; 3.7.5 Application of Permanent Magnets in Electrical Machines; 3.8 Assembly of Iron Stacks; Bibliography; 4 Inductances; 4.1 Magnetizing Inductance; 4.2 Leakage Inductances; 4.2.1 Division of Leakage Flux Components 4.3 Calculation of Flux Leakage

Sommario/riassunto

"This book is an in-depth essential reference of rotating electrical machine design theory and application. In the first part of the book the general theory governing the design of an electrical machine is presented; addressing the necessary fundamentals of electromagnetic theory; exploring possible winding arrangements and resistances; describing the behaviour of the magnetic circuit and flux leakage. After this introduction of principles the main body of the book focuses on the design of a rotating electrical machine. The book defines basic characteristics such as machine type (e.g. synchronous, asynchronous, DC and doubly salient reluctance machines) and type of construction (e.g. external pole, internal pole, axial flux and radial flux machines). It then moves on to provide a detailed analysis of the design process and properties of rotating electrical machines including the insulation and heat removal options. The book illustrates the necessary analytical calculations for machine design through direct design examples i.e. a permanent magnet motor for normal speeds with rotor surface magnets, traditional squirrel cage induction motor, a low speed high torque fractional slot permanent magnet motor etc."--
