Mathematical Models of Electrical Motors

Introduction
Voltage and flux-current equations
Space vectors and their representation in coordinate systems
Voltage and flux-current equations written in terms of space vectors
Transformation of vector equations into common rotating coordinate systems
Referring rotor quantities to the stator circuit
Instantaneous power and electromagnetic torque
Mechanical motion equation
Complete set of equilibrium equations
Park's transformation
Relationship between equations based on complex space vectors and the unified theory of electrical machines
Linearization of equilibrium equations
State equations and transfer functions
Per unit system

Three-Phase Induction Motor
Design and basic types
Vector equilibrium equations in per unit system
Block diagrams
State equations
Properties of induction motors in steady states
Speed control by changing the supply frequency

Three-Phase ac Synchronous Motors
Designs and major types
Equilibrium equations in per unit system
Block diagrams
Properties of synchronous motors in steady states
Speed control

Separately Excited dc Motors
Design and major parameters
Equilibrium equations and equivalent circuits
Block diagrams and operator transfer functions
Steady-state characteristics
Speed control methods

Power Converters for Motor Control
Line-commutated rectifiers and inverters
Frequency changes
Current-sourced inverters
Voltage-sourced inverters
Voltage-sourced dc-to-dc converters
Minimization of the losses of high-frequency power electronic switches