

CONTENTS

Preface	ix
CHAPTER 1. Introduction	3
<i>Summary of Results</i>	5
CHAPTER 2. Type and Model of Linear Induction Motor Used for Investigation	9
2.1. <i>Type of linear induction motor used for investigation</i>	9
2.2. <i>Primary winding</i>	10
2.3. <i>Equivalent current sheet and a model of the linear induction motor</i>	14
CHAPTER 3. Equations for the Electromagnetic Field in the Air Gap and Their Solutions Based on a One-dimensional Model	17
3.1. <i>Field equations and general solutions</i>	17
3.2. <i>Solution for steady operation</i>	20
CHAPTER 4. Results of Calculation on the Magnetic Field in the Air Gap	26
CHAPTER 5. Results of Calculation on the Performance of Linear Induction Motor under Constant Current Drive.....	34
CHAPTER 6. Calculations on the Performance of Linear Induction Motor under Constant Voltage Drive	38
CHAPTER 7. Low-speed and High-speed Motors	50
CHAPTER 8. Measures to Alleviate the End Effect in High-speed Linear Induction Motor	58

8.1.	<i>Selection of motor parameters</i>	58
8.2.	<i>Selection of the number of poles</i>	59
CHAPTER 9. Solutions for Field Equations of the Air Gap Based on a Two-dimensional Model		65
9.1.	<i>Introduction</i>	65
9.2.	<i>Derivation of field equations</i>	65
9.3.	<i>Boundary conditions</i>	58
9.4.	<i>Solution by means of Fourier transforms</i>	69
9.5.	<i>Performance calculations</i>	77
9.6.	<i>Simplified formula for calculating performance</i>	79
CHAPTER 10. Calculations on the Magnetic Field in the Air Gap ...		82
10.1.	<i>Nature of poles of Fourier transforms</i>	82
10.2.	<i>Calculation of the magnetic flux density distribution in the air gap and the adequacy of the two-dimensional model</i> ...	86
10.3.	<i>Two-dimensional field distribution without the end effect</i> ...	88
CHAPTER 11. Calculation of Performance by Means of the Two- dimensional Solution		94
CHAPTER 12. Experimental Results		101
CHAPTER 13. Compensation of the End Effect		111
13.1.	<i>Introduction</i>	111
13.2.	<i>A compensated linear induction motor of the two- windings type</i>	112
13.3.	<i>A compensated linear induction motor of the com- pensating-winding type</i>	114
13.4.	<i>Calculations of the performance of the compen- sated linear induction motor</i>	119
CHAPTER 14. A Linear Induction Motor of the Wound-secondary Type		124
14.1.	<i>Introduction</i>	125
14.2.	<i>Structure of a linear induction motor of the wound-secondary type</i>	125
14.3.	<i>End effect and transient phenomenon of linear induction motors of the wound-secondary type</i>	127
14.4.	<i>Analysis of the wound-secondary-end transient</i>	129

14.5. Starting, speed control and contactless power collection of high-speed trains by means of linear induction motors of the wound-secondary type	132
14.6. Example of a linear induction motor of the wound-secondary type	134
APPENDIX I. Determination of Secondary Resistance	136
APPENDIX II. Calculation of Linear Induction Motor Performance by Means of the Relaxation Method.....	142
APPENDIX III. Boundary Conditions.....	145
APPENDIX IV. Magnetic Flux Density Distribution Curves without Fringing	149
APPENDIX V. A Compensated Linear Induction Motor with a Single-Phase Compensating Winding or a Concentrated Compensating Winding	153
APPENDIX VI. Table of Linear Induction Motors.....	156
NOMENCLATURE	157
REFERENCES	160