

TABLE OF CONTENTS

1. INTRODUCTION.....	9
2. THE ROLE OF RAIL TRANSPORT IN THE ECONOMY OF INTEGRATING EUROPE.....	11
3. A HISTORICAL SKETCH.....	17
4. ADVANTAGES OF ELECTRIC TRACTION.....	21
4.1. External and internal costs of transport.....	24
4.2. Electrification threshold.....	25
5. VEHICLE'S MOTION.....	28
5.1. Motion equations.....	29
5.2. Resistance to motion.....	30
5.3. Limitations of a tractive effort.....	33
5.4. Phases of traction vehicle motion.....	41
6. TRACTION MOTORS.....	50
6.1. Requirements for traction motors.....	50
6.2. Characteristics of a DC series motor.....	51
6.3. AC motors.....	62
6.4. Transmission of a torque from a motor to vehicle's wheels.....	65
7. TRACTION VEHICLES.....	71
7.1. Electric locomotives.....	74
7.2. Electric traction units.....	79
7.3. Trains for high speed rides (high speed trains).....	82
7.4. Tilting trains.....	90
7.5. Electric trams.....	93
7.6. Trolleybuses.....	96
7.7. Rolling stock for metro.....	99
7.8. Autonomous traction.....	104
7.8.1. Traction with combustion engines.....	105
7.8.2. Road vehicles with an electric drive.....	106
7.8.3. Hybrid vehicles.....	108
7.9. Non-conventional vehicles - maglev.....	108
8. POWER SUPPLY SYSTEMS OF ELECTRIC TRACTION.....	111
8.1. Electric traction supply systems - requirements.....	112
8.2. Determining power supply system loads.....	117
8.3. Solutions for power supply systems.....	119
8.4. Overhead contact system - catenary.....	127

8.5. 3 kV DC system.....	137
8.6. AC 25 kV 50 Hz system.....	152
8.7. AC 15 kV 16 2/3 Hz system.....	155
8.8. Supply of electrified railway in Poland.....	158
8.9. Conclusions.....	159
9. SUMMARY.....	162
10. BIBLIOGRAPHY FOR SELF-STUDY.....	163
11. SAMPLE QUESTIONS FOR SELF-STUDY.....	164
12. POLISH-ENGLISH DICTIONARY OF BASIC TERMTNOLOGY RELATED TO ELEC- TRIC TRACTION.....	171