

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

National Aviation University

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**ELECTRIC AND MAGNETIC CIRCUITS
THEORY**

A series of lectures

Kyiv 2003

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M35

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The synopsis includes lectures on the theory of electrical and magnetic circuits, the different methods of calculation both steady and transients in linear and non-linear electrical and magnetic circuits. The fundamentals of the quadripoles theory are set up.

The lectures are intended for the students of specialities 8.091501 "Computer systems and networks", 8.090603 "Electrotechnical electrical power systems", 8.091401 "Control systems and automatics" etc.

Мартинюк В.С., Костель Л.Г.

Теорія електричних і магнітних кіл: Конспект лекцій (англійською мовою) - К.: НАУ, 2003. — 100 с.
Конспект містить лекції з теорії електричних і магнітних кіл. У ньому розглянуті різні методи розрахунку установлених і перехідних процесів в лінійних і нелінійних електричних і магнітних колах. Викладені основи теорії чотириполюсників.

Призначений для студентів спеціальностей 8.091501 "Комп'ютерні системи і мережі", 8.090603 "Електротехнічні системи електропостачання", 8.091401 "Системи управління і автоматики" та інші.

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INTRODUCTION

The title of these series of lectures is "Electrical engineering". Various electric and magnetic phenomena and their practical application are studied here. It is relevant to remark that the electromagnetic phenomena are used in aircraft equipment to generate, convert, transmit and distribute the electric power.

Let us note the fact that the basic theoretical concepts of the electromagnetic field, electromagnetic qualitative and quantitative phenomena of both direct and alternative current and various processes, which take place in magnetic circuits, are planned for studying within these series of lectures and practical trains. The electrical engineering is the basis of all special disciplines for the aircraft electrician engineer training course.

HISTORY of DEVELOPMENT AND STUDIES of ELECTRICAL AND MAGNETIC PHENOMENA AND THEIR PRACTICAL APPLICATION

The development of the electrical engineering goes back to in 1600, when an English physicist Hilbert published the results of electrical and magnetic phenomena researches. M.V. Lomonosoff, G.V. Richman, B. Franklin researched the atmospheric electricity. The modern electrical engineering started with the discovering of the electromagnetic induction law by Micl Faraday in 1831. In the first half of the 19-th century the chemical source of the direct current (d.c.) was discovered, the chemical, light and magnetic effects of current were researched (A. Volta, A.I. Ampere, V.V. Petroff, G.X. Oersted, A.X. Lentz). D.K. Maxwell (1831-1879) developed the theory of electromagnetic phenomena in "The Treatise about electricity and magnetism" and thus the foundation of the classical theory of electrical and magnetic phenomena was finished. G.R. Hertz's researches (1886 -1889), P.N. Lebedeff's works (1895), the invention of the radio by A.S. Popoff (1895) and also the works of other scientists had confirmed experimentally the conclusions of the theory about distribution of electromagnetic waves. The development of electrical engineering was promoted by the requirements of industrial production. In the first electrotechnical devices the chemical current sources were used. For example, in 1838 B.S. Jacobi