

CONTENTS

INTRODUCTION	3
1. DETERMINATION OF THE RADIATION FIELD ON THE GIVEN SOURCES	4
1.1. Basic problems of the aerial theory	4
1.2. Regulations of geometrical optics	6
1.3. The equivalence principle	7
1.4. The duality principle	8
1.5. Far-field radiation zone of an aerial	9
1.6. Intensity of radiation field of the aerial	12
1.7. Radiating power of aerial	12
2. ANTENNA PARAMETERS	15
2.1. Directivity diagram (pattern)	15
2.2. Phase characteristic of directivity	18
2.3. Polarization characteristic	19
2.4. Resistance of radiation	22
2.5. Efficiency	24
2.6. Input impedance	25
2.7. Directivity factor	25
2.8. Gain factor	28
2.9. Frequency properties of aeriels	30
2.10. Effective area	32
2.11. Effective length	33
3. ELEMENTARY RADIATORS	35
3.1. Electric dipole	35
3.2. Magnetic dipole	38
3.3. Elementary slot radiator	41
3.4. The Huygens element	44
4. THE THEORY OF THE DIPOLE ANTENNA	48
4.1. Radiation field of the dipole	48
4.2. Basic parameters of the dipole	55
5. SYSTEM OF RADIATORS	59
5.1. The pattern multiplication theorem	59
5.2. Radiation impedance of coupled antennas	61
5.3. Linear array	65
5.4. Radiation of cophased array	69
5.5. Linear array of nondirective radiators excited with phase shift	72

5.6. Wire with running wave of current	78
5.7. Non-equal amplitude excitation array	82
5.8. Nonuniformly spaced array	88
5.9. Two-radiators system	90
6. THE THEORY OF APERTURE AERIALS	95
6.1. Analysis of a radiation field of aperture aerials	95
6.2. The rectangular aperture with the uniform amplitude-phase distribution of tangential components	99
6.3. Radiation from the circular aperture with cophased and uniform distribution of tangential components	102
6.4. The aperture with non-uniform amplitude distribution	104
6.5. Influence of the phase distribution on the radiation field	108
7. INFLUENCE OF REFLECTING SURFACES ON ANTENNAS RADIATION	115
7.1. Method of images	115
7.2. The dipole located above the ground surface	118
7.3. Influence of metal bodies on radiation of the dipole	120
7.4. The unipole	127
8. THE THEORY OF RECEIVING ANTENNAS	130
8.1 The dipole in the field of the flat electromagnetic wave	130
8.2. The reciprocity principle in the theory of reception aerials	134
8.3. Power in loading of the receiving aerial	139
8.4. Noise temperature of the aerial	143
REFERENCE LIST	