MULTIELEMENT SYSTEM DESIGN IN ASTRONOMY AND RADIO SCIENCE

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MULTIELEMENT SYSTEM DESIGN IN ASTRONOMY AND RADIO SCIENCE

by

LAZARUS E. KOPILOVICH
Institute of Radio Physics and Electronics,
National Academy of Sciences of Ukraine,
Kharkov, Ukraine

and

LEONID G. SODIN
Institute of Radio Astronomy,
National Academy of Sciences of Ukraine,
Kharkov, Ukraine

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Radio telescope UTR-2: The North-South arm. A view from the ground.

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PREFACE

The multielement systems have been widely used in many fields of astronomy and radio science in the last decades. This is caused by the increasing demands on the resolution and sensitivity of such systems over the wide range of the electromagnetic wavelengths, from gamma up to radio. The ground-based optical and radio interferometers, gamma-ray and X-ray orbital telescopes, antenna arrays of radio telescopes and also some other radio devices belong to scientific instruments using multielement systems. Therefore, the current problems of the optimal construction of such systems, or precisely, those of searching for the best arrangement of the elements in them, were formulated. A rather large number of scientific papers, including those of the authors, is devoted to these problems, and we believe that the time has come to integrate the basic results of the papers into the monograph.

The offered book consists of three parts. The first part is concerned with the optimal synthesis of optical and radio interferometers of various types and purposes; the synthesis of non-equidistant antenna arrays is considered in the second part; and the methods for the construction of coded masks for X-ray and gamma-ray orbital telescopes are expounded in the third one. Since in the text combinatorial constructions which are little known to astronomers are used, the necessary information is given in the appendices. Various tables containing the parameters of the systems considered are also represented. In a number of cases, they will enable one to facilitate their designing and development.

We hope that the book shall be of interest both to scientists and engineers who are concerned with developing astronomical instruments of a high spatial resolution. The materials given in the second part may also be of help to the designers of large antenna arrays in radio wave range, e.g. of antennas for the long-range radar and radio communication.

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L.Kopilovich
Institute of Radio Physics and Electronics
of National Academy of Sciences
Kharkov, Ukraine

L.Sodin
Institute of Radio Astronomy
of National Academy of Sciences
Kharkov, Ukraine