BOOK REVIEWS

J. Bognár, Indefinite Inner Product Spaces, (Ergebnisse der Mathematik und Ihrer Grenzgebiete, Band 78), IX + 224 pages, Berlin–Heidelberg–New York, Springer-Verlag, 1974.

By definition an indefinite inner product space is a real or complex vector space with a hermitian bilinear form prescribed on it so that the corresponding quadratic form assumes both positive and negative values. The subject arose from quantum field theory some thirty years ago, its first mathematical treatment is due to Pontrjagin. János Bognár, whose results made an essential contribution to this theory, gives in his book a compact, clear and very accurate treatment of the geometry, the topology and the theory of operators of indefinite inner product spaces. The presentation proceeds from the general to more and more special cases.

The first two chapters consider general inner product spaces without topology. Beyond the notions analogous to the standard Hilbert space terms, in indefinite inner product spaces some new objects arise: isotropic vectors, neutral and definite subspaces; plus-operators (operators carrying nonnegative vectors into nonnegative ones) and Ponsonen operators (operators which behave like symmetric operators in Hilbert space).

In general inner product spaces there are no such natural ways to introduce topologies as in a Hilbert space; the problems connected with this circumstance are treated in chapters III and IV.

The most important special indefinite inner product spaces — the Krein spaces — can be represented as the direct sum of a positive and a negative definite complete subspace. Chapter V deals with the geometry and topology of Krein spaces. There is an application of Krein space methods to a problem of dissipative operators in Hilbert space.

Chapters VI and VII contain the theory of operators in Krein spaces. Some well-known theorems for operators in Hilbert space are valid in a more general form in Krein spaces. For example, every bounded operator in a Hilbert space has a unitary dilation on a suitable Krein space; every selfadjoint operator in a Krein space having infinite dimensional positive and negative definite components has the form T^*T .

Chapter VIII is devoted to the problem of invariant semidefinite (definite) subspaces of plus-operators, unitary and selfadjoint operators in Krein spaces. An application is given to the theory of quadratic operator equations in Hilbert space.

Pontrjagin spaces are special cases of Krein spaces: one of its two definite components has finite dimension. Chapter IX deals with the geometry and the theory of the linear operators of Pontrjagin spaces. The deepest result presented here is Theorem 4.3 yielding an upper bound for the total length of all Jordan chains of isometric operators in Pontrjagin spaces, excepting chains of length 1 to unimodular eigenvalues.

The list of references includes 236 items.

A. Krámlí (Budapest)

F. L. Bauer, R. Gnatz and U. Hill, Informatik. Aufgaben und Lösungen, Erster und zweiter Teil (Heidelberger Taschenbücher, Sammlung Informatik, Bd. 159, 160), XI + 163 pp., 54 figures; X + 173 pp., 45 figures, Springer-Verlag, Berlin–Heidelberg–New York, 1975 and 1976, resp.

The content and construction of these problem-books strictly adhere to those of the volumes „Informatik. Eine einführende Übersicht I–II“, by F. L. BAUER and G. GOOS (Heidelberger Taschenbücher Bd. 80, 91). These books (reviewed in Zentralblatt für Mathematik **213**, 177 and **221**. 68005, resp.) are generally considered as successful introductory text-books to computer science. The choice of the problems clearly shows that they are rather the byproducts of courses in computer-science than barely the results of a desk-job. Therefore they really give a helping hand in the tutorial work. Solutions with detailed remarks are given. In spite of their strong connection to the above mentioned textbooks, lecturers using other textbooks can also utilize them.

T. Nemetz (Budapest)