BOOK REVIEWS

DOWSON, H. R., *Spectral Theory of Linear Operators* (London Mathematical Society Monographs No. 12, Academic Press, 1978), xii + 422 pp., £20·00.

The structure of an arbitrary linear operator on a finite dimensional complex linear space is completely understood in the sense that the Jordan form provides a canonical description which determines the operator up to similarity. In contrast, the structure of a general bounded linear operator on an infinite dimensional Banach space remains almost a complete mystery. Progress has been made, however, in analysing certain special classes of operators, where some aspect of the finite dimensional situation has been retained, and it is the aim of the present monograph to describe some of these developments. The author is concerned for the most part with operators on Banach spaces, rather than in the Hilbert space theory where the geometry of the underlying space plays a more significant role. Also, he deals almost exclusively with single operators, rather than with algebraic systems of operators.

The main classes of operators discussed are compact, Riesz, prespectral, spectral and well-bounded operators. Of these, the first is classical, dating back to the pioneering work of Fredholm, Riesz and others during the early part of this century, whereas the remainder have all been introduced during the last twenty-five years or so. It would not be appropriate to embark here on any technical description of these operators. However, the common theme occurring throughout is the idea of the decomposition of the underlying Banach space into complementary subspaces corresponding to certain distinguished subsets of the spectrum of the operator under discussion. (The spectrum takes the place in infinite dimensions of the set of eigenvalues in finite dimensions.) For compact and Riesz operators, the distinguished subsets are points, for prespectral and spectral operators they are Borel sets in the complex plane, and for well-bounded operators they are intervals of the real axis. For each class of operators a version of the Jordan decomposition is obtained. There is also a brief chapter on hermitian operators on Banach spaces. As well as being of interest in their own right, these have proved useful in the study of prespectral and spectral operators.

Since there are many good accounts of the theory of compact operators, this section has been kept reasonably brief. There is little mention of the duality aspects of the theory, but Ringrose's work on superdiagonalisation and Hilden's proof of Lomonosov's celebrated invariant subspace theorem have been included. Much of the material discussed in the rest of the book has only appeared previously in research articles and, in writing a more unified account, the opportunity has been taken to include simplifications of earlier proofs. The book has been carefully written and is well organised, with useful "Notes and Comments" sections giving historical perspective and indicating more recent developments. Only a basic working knowledge of functional analysis is assumed and so it should be of great help to the beginning graduate student who wishes to learn about this branch of operator theory. It will also be an excellent reference and source of information for those already working in the area.

T. A. GILLESPIE

REID, C., *Courant in Göttingen and New York. The story of an improbable mathematician* (Springer-Verlag, New York, 1976), 314 pp.

This book is a sequel to the outstandingly successful book on Hilbert by the same author which was published in 1970. Originally intended to be a collection of reminiscences rather than a biography of Courant, who was Hilbert's assistant in Göttingen and who later followed Klein as the dominant figure in the mathematical school there, the present book was published against the advice of some of Courant's friends who, because of Courant's ambivalent nature, would have preferred no biography

https://doi.org/10.1017/S0013091500003886 Published online by Cambridge University Press