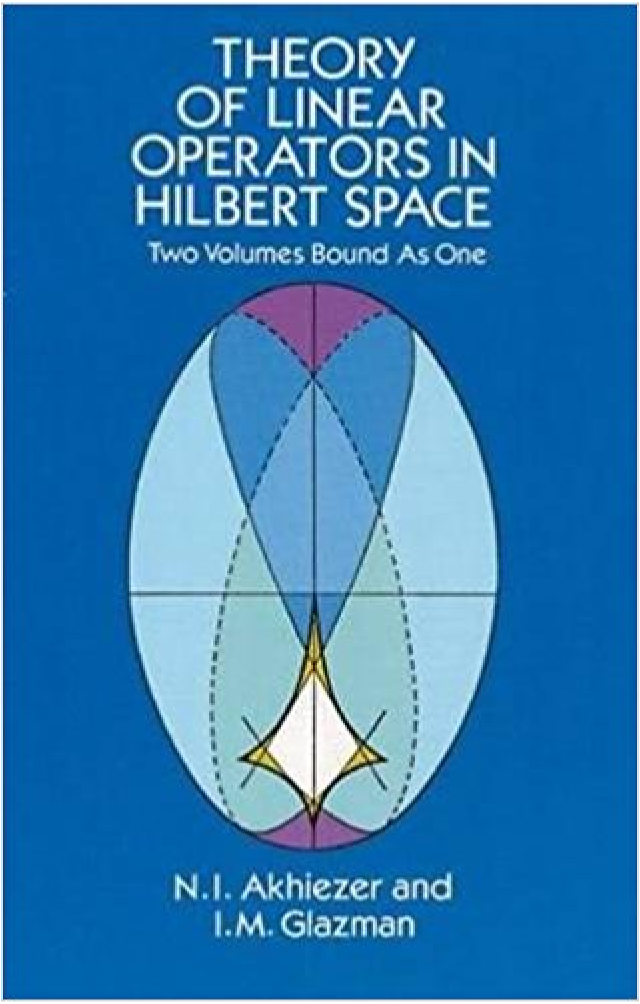
Theory Of Linear Operators In Hilbert Space (Dover Books On Mathematics)



Synopsis

This classic textbook by two mathematicians from the USSR’s prestigious Kharkov Mathematics Institute introduces linear operators in Hilbert space, and presents in detail the geometry of Hilbert space and the spectral theory of unitary and self-adjoint operators. It is directed to students at graduate and advanced undergraduate levels, but because of the exceptional clarity of its theoretical presentation and the inclusion of results obtained by Soviet mathematicians, it should prove invaluable for every mathematician and physicist. 1961, 1963 edition.

Book Information

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Customer Reviews

Text: English (translation) Original Language: Russian

This book has too my typo that makes it almost impossible to read. I hate to read a book like this.

good

great book for a back ground reading .....

The spectral theorem of David Hilbert, John von Neumann, and Marshall Stone gives a complete answer to the question of which operators admit a diogonal representation, up to unitary equivalence, and makes the question precise as well. The theorem states that these are the normal operators in Hilbert space. This includes the selfadjoint operators which represent observables in quantum physics, and the more interesting ones are unbounded. Remember the Heisenberg commutation relations do not admit bounded solutions. But there is a mathematical distinction between formally selfadjoint operators (also called symmetric operators) and the selfadjoint ones. It is only the latter to which the spectral theorem applies. The distinction between the two is understood from a pair of indicies (n,m), now called deficiency indices. In some applications they representboundary conditions, and when n = m, and the boundary conditions are assigned, the symmetric operator in question has selfadjoint extensions. And we know from von Neumann what they are. A central question in the book concerns the issue of unequal indices. Then selfadjoint extensions do not exist, at least not unless the Hilbert space is enlarged. A central theme in the book is that in case of unequal indices, there is a larger Hilbert space which does in fact admit selfadjoint extensions. The co-authors, along with Naimark, are the authorities on this. Because of applications to PDE theory and to physics, there has been constant interest in the theme right up to the present. Even the current interest, and lively activity, in quantum measurement theory (in connection with quantum information theory) and entanglement brings back to to the fore this old issue around diagonalizing operators by passing to an "enlarged" (or dilated)Hilbert space, or looking for an orthonormal basis in the extended Hilbert space. So the theme of the book is still current.

This is a great intro to functional analysis. Having taken a graduate course on the subject, I used this as my text. The proofs are very readable and kept clear and simple. You'll see the subject develop before your eyes. One thing: when reading this book on infinite dimensional vector spaces, always try to draw a parallel with the finite dimensional version of the subject, linear algebra. You'll appreciate the book all the more. For every theorem relating to a bounded linear operator on Hilbert space, replace the operator by a matrix on Euclidean n-space.. you'll say "oh yeah! I remember that from linear algebra!"

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