

POSITIVE LINEAR OPERATORS IN SEMI-ORDERED LINEAR SPACES

By

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Since in 1907 O. PERRON [9] discovered a remarkable spectral property of positive matrices and shortly later G. FROBENIUS [1], [2] and R. JENTZSCH [4] investigated and generalized it further, many authors have considered special properties of positive linear operators. Especially M. KREIN and M. A. RUTMAN [5]^{*} considered with success a generalization to Banach spaces with a cone. They obtained particularly important results, when the space is lattice ordered or the cone has an interior point. In this paper, we consider spectral properties of positive compact (=completely continuous) linear operators on a universally continuous Banach space (= conditionally complete Banach lattice). Our main aim is to generalize the results of G. FROBENIUS [2] to infinite dimensional spaces.

In §1 preliminary definitions are summarized. In §2 the fundamental theorem on the maximum positive spectrum is proved (Theorem 2.1). In §3 we define *completely positive* linear operators. The operators of this class play a similar rôle as strongly positive operators in [5]. In §4 we obtain under some additional conditions a necessary and sufficient condition for that a positive compact linear operator is quasinilpotent (Theorem 4.7). In §5 the proper values with maximum modulus of a positive compact linear operator are determined (Theorem 5.2).

§ 1. Preliminaries. We recall briefly definitions from the theory of semi-ordered linear spaces and linear operators. A lattice ordered linear space (with real scalar) R is said to be *universally continuous*, if for any $\alpha_\lambda \geq 0$ ($\lambda \in A$) there exists $\bigcap_{\lambda \in A} \alpha_\lambda$. A linear manifold N of R is said to be *normal* if there exists a positive linear projection $[N]$ of R onto N such that $|x - [N]x| \wedge |y| = 0$ for $x \in R$ and $y \in N$. The projection

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Semi Ordered Linear Spaces

Hidegorō Nakano



Semi Ordered Linear Spaces:

Modulared Semi-ordered Linear Spaces Hidegorō Nakano,1955 **Semi-ordered Linear Spaces** Hidegoro Nakano,1985 **Semi-ordered linear spaces** 半順序線性空間,1955 *Semi-ordered linear spaces* Hidegorō Nakano,1955

Ordered Linear Spaces Graham Jameson,2006-11-15 **Canadian Mathematical Bulletin** ,1969 **Riesz Spaces II** A.C. Zaanen,1983-05-01 While Volume I by W A J Luxemburg and A C Zaanen NHML Volume 1 1971 is devoted to the algebraic aspects of the theory this volume emphasizes the analytical theory of Riesz spaces and operators between these spaces Though the numbering of chapters continues on from the first volume this does not imply that everything covered in Volume I is required for this volume however the two volumes are to some extent complementary **Locally Solid Riesz Spaces with Applications to Economics** Charalambos D. Aliprantis,Owen Burkinshaw,2025-05-14 Riesz space or a vector lattice is an ordered vector space that is simultaneously a lattice A topological Riesz space also called a locally solid Riesz space is a Riesz space equipped with a linear topology that has a base consisting of solid sets Riesz spaces and ordered vector spaces play an important role in analysis and optimization They also provide the natural framework for any modern theory of integration This monograph is the revised edition of the authors book Locally Solid Riesz Spaces 1978 Academic Press It presents an extensive and detailed study with complete proofs of topological Riesz spaces The book starts with a comprehensive exposition of the algebraic and lattice properties of Riesz spaces and the basic properties of order bounded operators between Riesz spaces Subsequently it introduces and studies locally solid topologies on Riesz spaces the main link between order and topology used in this monograph Special attention is paid to several continuity properties relating the order and topological structures of Riesz spaces the most important of which are the Lebesgue and Fatou properties A new chapter presents some surprising applications of topological Riesz spaces to economics In particular it demonstrates that the existence of economic equilibria and the supportability of optimal allocations by prices in the classical economic models can be proven easily using techniques from the theory of topological Riesz spaces At the end of each chapter there are exercises that complement and supplement the material in the chapter The last chapter of the book presents complete solutions to all exercises Prerequisites are the fundamentals of real analysis measure theory and functional analysis This monograph will be useful to researchers and graduate students in mathematics It will also be an important reference tool to mathematical economists and to all scientists and engineers who use order structures in their research **Riesz Spaces** Adriaan Cornelis Zaanen,1983 **Riesz Spaces** W.A.J. Luxemburg,2000-04-01 Riesz Spaces **Normed Linear Spaces** Mahlon M. Day,2013-03-14 **Canadian Journal of Mathematics** ,1951 Contributions to Operator Theory and its Applications Takayuki Furuta,I. Gohberg,2012-12-06 This volume is dedicated to Tsuyoshi Ando a foremost expert in operator theory matrix theory complex analysis and their applications on the occasion of his 60th birthday The book opens with his biography and list of publications It contains a selection of papers covering a broad spectrum of topics ranging from abstract operator

theory to various concrete problems and applications The majority of the papers deal with topics in modern operator theory and its applications This volume also contains papers on interpolation and completion problems factorization problems and problems connected with complex analysis The book will appeal to a wide audience of pure and applied mathematicians

Isometries on Banach Spaces Richard J. Fleming, James E. Jamison, 2002-12-23 Fundamental to the study of any mathematical structure is an understanding of its symmetries In the class of Banach spaces this leads naturally to a study of isometries the linear transformations that preserve distances In his foundational treatise Banach showed that every linear isometry on the space of continuous functions on a compact metric Orlicz Spaces and Modular Spaces J.

Musielak, 2006-11-14 **Ordered Vector Spaces and Linear Operators** Romulus Cristescu, 1976 *Finite Elements in Vector Lattices* Martin R. Weber, 2014-08-20 The book is the first systematical treatment of the theory of finite elements in Archimedean vector lattices and contains the results known on this topic up to the year 2013 It joins all important contributions achieved by a series of mathematicians that can only be found in scattered in literature **Theory of**

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Noncommutative Analysis Gerard Buskes, Marcel de Jeu, Peter Dodds, Anton Schep, Fedor Sukochev, Jan van Neerven, Anthony Wickstead, 2019-08-09 Capturing the state of the art of the interplay between positivity noncommutative analysis and related areas including partial differential equations harmonic analysis and operator theory this volume was initiated on the occasion of the Delft conference in honour of Ben de Pagter's 65th birthday It will be of interest to researchers in positivity noncommutative analysis and related fields Contributions by Shavkat Ayupov Amine Ben Amor Karim Boulabiar Qingying Bu Gerard Buskes Martijn Caspers Jurie Conradie Garth Dales Marcel de Jeu Peter Dodds Theresa Dodds Julio Flores Jochen Glöck Jacobus Grobler Wolter Groenevelt Markus Haase Klaas Pieter Hart Francisco Hernández Jamel Jaber Rien Kaashoek Turabay Kalandarov Anke Kalauch Arkady Kitover Erik Koelink Karimbergen Kudaybergenov Louis Labuschagne Yongjin Li Nick Lindemulder Emiel Loring Qi L Miek Messerschmidt Susumu Okada Mehmet Orhon Denis Potapov Werner Ricker Stephan Roberts Pablo Román Anton Schep Claud Steyn Fedor Sukochev James Sweeney Guido Sweers Pedro Tradacete Jan Harm van der Walt Onno van Gaans Jan van Neerven Arnoud van Rooij Freek van Schagen Dominic Vella Mark Veraar Anthony Wickstead Marten Wortel Ivan Yaroslavl'tsev and Dmitriy Zanin

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Table of Contents Semi Ordered Linear Spaces

1. Understanding the eBook Semi Ordered Linear Spaces
 - The Rise of Digital Reading Semi Ordered Linear Spaces
 - Advantages of eBooks Over Traditional Books
2. Identifying Semi Ordered Linear Spaces
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Semi Ordered Linear Spaces
 - User-Friendly Interface
4. Exploring eBook Recommendations from Semi Ordered Linear Spaces
 - Personalized Recommendations
 - Semi Ordered Linear Spaces User Reviews and Ratings
 - Semi Ordered Linear Spaces and Bestseller Lists
5. Accessing Semi Ordered Linear Spaces Free and Paid eBooks
 - Semi Ordered Linear Spaces Public Domain eBooks
 - Semi Ordered Linear Spaces eBook Subscription Services
 - Semi Ordered Linear Spaces Budget-Friendly Options

6. Navigating Semi Ordered Linear Spaces eBook Formats
 - ePub, PDF, MOBI, and More
 - Semi Ordered Linear Spaces Compatibility with Devices
 - Semi Ordered Linear Spaces Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Semi Ordered Linear Spaces
 - Highlighting and Note-Taking Semi Ordered Linear Spaces
 - Interactive Elements Semi Ordered Linear Spaces
8. Staying Engaged with Semi Ordered Linear Spaces
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Semi Ordered Linear Spaces
9. Balancing eBooks and Physical Books Semi Ordered Linear Spaces
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Semi Ordered Linear Spaces
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Semi Ordered Linear Spaces
 - Setting Reading Goals Semi Ordered Linear Spaces
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Semi Ordered Linear Spaces
 - Fact-Checking eBook Content of Semi Ordered Linear Spaces
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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