

Introduction to topological groups [☆]

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Abstract

We present a concise survey of old and new results concerning cardinal functions on topological groups and then establish various relations between the classes of σ -compact, \aleph_0 -bounded and \mathbb{R} -factorizable topological groups. The article is addressed to the general topology minded reader with no (or little) experience in topological algebra. © 1998 Published by Elsevier Science B.V.

Keywords: Continuous seminorm; Homomorphism; Product of groups; Quotient group; Cardinal functions; σ -compact; τ -bounded group; \mathbb{R} -factorizable group

AMS classification: Primary 54H11; 22A05, Secondary 54A25; 54B99; 54D45

0. Introduction

The notion of a topological group goes back to the second half of the nineteenth century and has its origin in the works on smooth manifolds. The groups which appeared there were the groups of (analytic) homeomorphisms of manifolds. After a certain period of experimentation with the concept of a topological group and a quest for a general and flexible but rigorous definition of the concept it became clear that the basic thing was the continuity of the group operations. By the early thirties of the present century the concept of a topological group had been widely accepted and the first expositions of the subject appeared in [27,43,21,68].

Now we find the notion of a topological group in almost all parts of mathematics, from functional analysis to computer science. An excellent introduction to the theory of

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An Introduction To Topological Groups

**Michael Hrušák, Ángel Tamariz-
Mascarúa, Mikhail Tkachenko**



An Introduction To Topological Groups:

Introduction to Topological Groups Taqdir Husain, 2018-02-15 Concise treatment covers semitopological groups locally compact groups Harn measure and duality theory and some of its applications The volume concludes with a chapter that introduces Banach algebras 1966 edition *An Introduction to Topological Groups* Philip J Higgins, 1974

Introduction to topological groups Philip J. Higgins, 1974 **Topological Groups and Related Structures** A. V. Arkhangel'skii, Mikhail Tkachenko, 2008 This book presents a large amount of material both classic and recent on occasion unpublished about the relations of Algebra and Topology It therefore belongs to the area called Topological Algebra More specifically the objects of the study are subtle and sometimes unexpected phenomena that occur when the continuity meets and properly feeds an algebraic operation Such a combination gives rise to many classic structures including topological groups and semigroups paratopological groups etc Special emphasis is given to tracing the influence of compactness and its generalizations on the properties of an algebraic operation causing on occasion the automatic continuity of the operation The main scope of the book however is outside of the locally compact structures thus distinguishing the monograph from a series of more traditional textbooks The book is unique in that it presents very important material dispersed in hundreds of research articles not covered by any monograph in existence The reader is gently introduced to an amazing world at the interface of Algebra Topology and Set Theory He she will find that the way to the frontier of the knowledge is quite short almost every section of the book contains several intriguing open problems whose solutions can contribute significantly to the area *Introduction to Topological Groups* Philip J. Higgins, 1979 [An introduction to topological groups](#) Morikuni Goto, 1974 *Topological Groups and Related Structures, An Introduction to Topological Algebra.* Alexander Arhangel'skii, Mikhail Tkachenko, 2008-05-01 Algebra and topology the two fundamental domains of mathematics play complementary roles Topology studies continuity and convergence and provides a general framework to study the concept of a limit Much of topology is devoted to handling in finite sets and in finite itself the methods developed are qualitative and in a certain sense irrational algebra studies all kinds of operations and provides a basis for algorithms and calculations Very often the methods here are nitistic in nature Because of this difference in nature algebra and topology have a strong tendency to develop independently not in direct contact with each other However in applications in higher level domains of mathematics such as functional analysis dynamical systems representation theory and others topology and algebra come in contact most naturally Many of the most important objects of mathematics represent a blend of algebraic and of topological structures Topological function spaces and linear topological spaces in general topological groups and topological fields transformation groups topological lattices are objects of this kind Very often an algebraic structure and a topology come naturally together this is the case when they are both determined by the nature of the elements of the set considered a group of transformations is a typical example The rules that describe the relationship between a topology and an algebraic operation are almost always

transparent and natural the operation has to be continuous jointly or separately **Topology** George McCarty, 1967

Topological Groups and the Pontryagin-van Kampen Duality Lydia Außenhofer, Dikran Dikranjan, Anna Giordano Bruno, 2021-11-22 This book provides an introduction to topological groups and the structure theory of locally compact abelian groups with a special emphasis on Pontryagin van Kampen duality including a completely self contained elementary proof of the duality theorem Further related topics and applications are treated in separate chapters and in the appendix

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Topological Groups Nelson G. Markley, 2010-09-22 A user friendly introduction to metric and topological groups Topological Groups An Introduction provides a self contained presentation with an emphasis on important families of topological groups The book uniquely provides a modern and balanced presentation by using metric groups to present a substantive introduction to topics such as duality while also shedding light on more general results for topological groups Filling the need for a broad and accessible introduction to the subject the book begins with coverage of groups metric spaces and topological spaces before introducing topological groups Since linear spaces algebras norms and determinants are necessary tools for studying topological groups their basic properties are developed in subsequent chapters For concreteness product topologies quotient topologies and compact open topologies are first introduced as metric spaces before their open sets are characterized by topological properties These metrics along with invariant metrics act as excellent stepping stones to the subsequent discussions of the following topics Matrix groups Connectedness of topological groups Compact groups Character groups Exercises found throughout the book are designed so both novice and advanced readers will be able to work out solutions and move forward at their desired pace All chapters include a variety of calculations remarks and elementary results which are incorporated into the various examples and exercises Topological Groups An Introduction is an excellent book for advanced undergraduate and graduate level courses on the topic The book also serves as a valuable resource for professionals working in the fields of mathematics science engineering and physics Reviews of Papers in Algebraic and Differential Topology, Topological Groups, and Homological Algebra Norman Earl Steenrod, 1968

Pseudocompact Topological Spaces Michael Hrušák, Ángel Tamariz-Mascarúa, Mikhail Tkachenko, 2018-07-19 This book intended for postgraduate students and researchers presents many results of historical importance on pseudocompact spaces In 1948 E Hewitt introduced the concept of pseudocompactness which generalizes a property of compact subsets of the real line A topological space is pseudocompact if the range of any real valued continuous function defined on the space is a bounded subset of the real line Pseudocompact spaces constitute a natural and fundamental class of objects in General Topology and research into their properties has important repercussions in diverse branches of Mathematics such as Functional Analysis Dynamical Systems Set Theory and Topological Algebraic structures The collection of authors of this

volume include pioneers in their fields who have written a comprehensive explanation on this subject In addition the text examines new lines of research that have been at the forefront of mathematics There is as yet no text that systematically compiles and develops the extensive theory of pseudocompact spaces making this book an essential asset for anyone in the field of topology

An Introductory Examination of Topological Groups Stephen Lyon Bascom,1972

Introduction to Topological Manifolds John Lee,2010-12-25 This book is an introduction to manifolds at the beginning graduate level It contains the essential topological ideas that are needed for the further study of manifolds particularly in the context of differential geometry algebraic topology and related fields Its guiding philosophy is to develop these ideas rigorously but economically with minimal prerequisites and plenty of geometric intuition Although this second edition has the same basic structure as the first edition it has been extensively revised and clarified not a single page has been left untouched The major changes include a new introduction to CW complexes replacing most of the material on simplicial complexes in Chapter 5 expanded treatments of manifolds with boundary local compactness group actions and proper maps and a new section on paracompactness This text is designed to be used for an introductory graduate course on the geometry and topology of manifolds It should be accessible to any student who has completed a solid undergraduate degree in mathematics The author's book Introduction to Smooth Manifolds is meant to act as a sequel to this book

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