

## DIMENSION OF MAPS, UNIVERSAL SPACES, AND HOMOTOPY

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UDC 515.12

**ABSTRACT.** This paper is a survey of some recent results in dimension theory. The main topics under consideration are: dimension of maps in the classical and extension dimension theories, universal spaces (in particular, universal compacta) in extension dimension theory, and  $[L]$ -homotopy. A number of theorems included in the survey are accompanied by proofs.

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### 1. Preliminaries

**1.1. Introduction.** The study of universal spaces and dimensional properties of maps is a classical direction in dimension theory. The goal of this paper is to provide an overview of some recent related results. We did not aim at full coverage of all achievements in this very broad field. Instead, we included proofs of some theorems, thus hoping to convey the key ideas to the reader.

The paper is organized as follows. We begin by introducing our notation and some preliminary facts in Sec. 1.2. In Sec. 1.3, we recall the definition of extension dimension and related concepts. Further, we state Dranishnikov's theorem, which describes extension dimension in terms of cohomological dimension, and discuss some related questions. Section 2, which opens the main part of this paper, is devoted to dimension of maps whose ranges are metrizable  $C$ -spaces. In particular, we present generalized versions of the parametric decomposition theorem and of the parametric Hurewicz theorem on regularly branched maps. A number of results on embeddings in  $\mathbb{R}^n$  avoiding given collections of planes or having "small" intersections with them constitute Sec. 3. Various generalizations of theorems on dimension-lowering and dimension-raising maps to extension dimension are discussed in Sec. 4. Section 5 is devoted to universal spaces in extension theory. We are mainly interested in the existence of universal compacta of given extension dimension. In relation to this problem, we introduce a special class of CW-complexes, called quasi-finite complexes, and study their properties. "Classical" universal spaces have many useful properties (in addition to universality). In particular, they are absolute extensors in the corresponding dimension. We analyze the possibility of obtaining extension-dimension analogs of universal spaces with a similar property in Sec. 6. In Sec. 7, we describe a general approach to quasi-finite complexes and show that these complexes behave well in many respects, thus

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# Universal Spaces And Mapping

**1878 U.S. Commission to the Paris  
exposition, U. S. Commission to the  
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## **Universal Spaces And Mapping:**

Universal Spaces and Mappings S.D. Iliadis,2005-01-19 Universal Spaces and Mappings is devoted to universality problems A new approach to these problems is given using some specific spaces Since the construction of these specific spaces is set theoretical the given theory can be applied to different topics of Topology such as universal mappings dimension theory action of groups inverse spectra isometrical embeddings and so on Universal spaces Universal mappings Dimension theory Actions of groups Isometric Universal Spaces *Fractals and Universal Spaces in Dimension Theory* Stephen Lipscomb,2008-10-28 Historically for metric spaces the quest for universal spaces in dimension theory spanned approximately a century of mathematical research The history breaks naturally into two periods the classical separable metric and the modern not necessarily separable metric The classical theory is now well documented in several books This monograph is the first book to unify the modern theory from 1960 2007 Like the classical theory the modern theory fundamentally involves the unit interval Unique features include The use of graphics to illustrate the fractal view of these spaces Lucid coverage of a range of topics including point set topology and mapping theory fractal geometry and algebraic topology A final chapter contains surveys and provides historical context for related research that includes other imbedding theorems graph theory and closed imbeddings Each chapter contains a comment section that provides historical context with references that serve as a bridge to the literature This monograph will be useful to topologists to mathematicians working in fractal geometry and to historians of mathematics Being the first monograph to focus on the connection between generalized fractals and universal spaces in dimension theory it will be a natural text for graduate seminars or self study the interested reader will find many relevant open problems which will create further research into these topics **The Universal Instructor, Or, Self-culture for All. [With Illustrations and Maps.]** Ward, Lock and co, ltd,1884 *Constant Mean Curvature Surface, Harmonic Map and Universal Teichmüller Space* Tom Yau-Heng Wan,1991 *Advanced DBA Certification Guide and Reference for DB2 Universal Database V8 for Linux, UNIX, and Windows* Dwaine Snow,Thomas X. Phan,2003 Straight from IBM Advanced DBA Certification Guide and Reference for DB2 Universal Database v8for Linux UNIX and Windowsis the definitive guide to enterprise class DB2 v8 administration andthe onlyauthoritative self study guide for IBM s new DB2 advanced DBA exam Delivers proventechniques for enterprise class security user management recovery scalability optimization troubleshooting remote administration and more CD ROM DB2 Universal Database v8 EnterpriseServer Edition trial version plus complete documentation Soviet Mathematics ,1972 Milton's Paradise Lost, Books I. and II. John Milton,1879 Chambers's Encyclopedia A dictionary of universal knowledge ,1891 *Universal Morphisms* P. C. Baayen,1964 **Revised Universal Time Diagrams (in Colors) Standard Time Diagrams on Reverse Side of Same Sheet ...** Toledo Pheils Universal Time Company,1914 **CHAMBERS'S ENCYCLOPAEDIA: A DICTIONARY OF UNIVERSAL KNOWLEDGE FOR THE PEOPLE** ,1878 Reports on the Vienna Universal Exhibition of

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