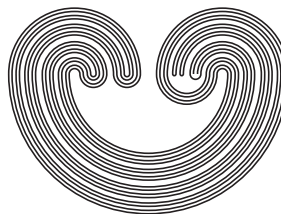


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TOPOLOGY PROCEEDINGS



Volume 54, 2019

Pages 199–203

<http://topology.nipissingu.ca/tp/>

SPLITTING OF COLLAPSING MAPS FOR FREE ABELIAN TOPOLOGICAL GROUPS

by

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Electronically published on March 8, 2019

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E-mail: topolog@auburn.edu

ISSN: (Online) 2331-1290, (Print) 0146-4124

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ALEXANDER DRANISHNIKOV

ABSTRACT. We prove the following.

Theorem. *Suppose that X is a finite complex and Y is a connected subcomplex such that $H^{i+1}(X/Y; H_i(Y)) = 0$ for all $i > 0$. Then, for free abelian topological groups,*

$$\mathbb{A}(X) \cong \mathbb{A}(X/Y) \times \mathbb{A}(Y).$$

As a corollary, we obtain that $\mathbb{A}(\mathbb{C}P^2) = \mathbb{A}(S^2 \vee S^4)$, whereas $\mathbb{F}(\mathbb{C}P^2) \neq \mathbb{F}(S^2 \vee S^4)$ where $\mathbb{F}(X)$ denotes free topological group generated by X .

1. INTRODUCTION

The free topological group $\mathbb{F}(X)$ and the free abelian topological group $\mathbb{A}(X)$ generated by a topological space X were defined first by A. A. Markov [7] and [8] in the topological category and then by M. I. Graev [6] in the pointed topological category. Markov's and Graev's definitions are closely related. In this paper, we consider the latter. We consider these groups for finite CW complexes X . Note that there are natural embeddings $X \subset \mathbb{F}(X)$ and $X \subset \mathbb{A}(X)$ where the base point x_0 is identified with the unit.

The defining property of $\mathbb{A}(X)$ is the following: *For every continuous map $f : X \rightarrow G$ of a pointed compact metric space (X, e) to a topological abelian group G with $f(e) = 0 \in G$, there is a unique extension to a continuous homomorphism $\bar{f} : \mathbb{A}(X) \rightarrow G$.* For $\mathbb{F}(X)$, the defining property is similar (see [2]).

2010 *Mathematics Subject Classification.* Primary 22A05; Secondary 54H11, 55S35.

Key words and phrases. free abelian topological group, free topological group.

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