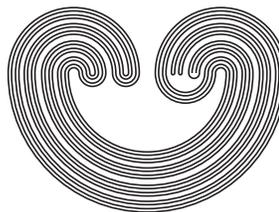


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## SPLITTING OF COLLAPSING MAPS FOR FREE ABELIAN TOPOLOGICAL GROUPS

by

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## SPLITTING OF COLLAPSING MAPS FOR FREE ABELIAN TOPOLOGICAL GROUPS

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]).

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

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