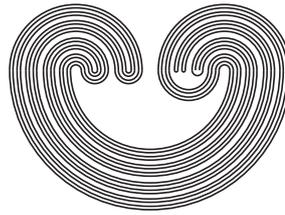


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## STRAIGHT HOMOTOPY INVARIANTS

by

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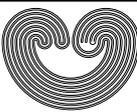
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## STRAIGHT HOMOTOPY INVARIANTS

SEMËN PODKORYTOV

**ABSTRACT.** Let  $X$  and  $Y$  be spaces and  $M$  be an abelian group. A homotopy invariant  $f: [X, Y] \rightarrow M$  is called straight if there exists a homomorphism  $F: L(X, Y) \rightarrow M$  such that  $f([a]) = F(\langle a \rangle)$  for all  $a \in C(X, Y)$ . Here  $\langle a \rangle: \langle X \rangle \rightarrow \langle Y \rangle$  is the homomorphism induced by  $a$  between the abelian groups freely generated by  $X$  and  $Y$  and  $L(X, Y)$  is a certain group of “admissible” homomorphisms. We show that all straight invariants can be expressed through a “universal” straight invariant of homological nature.

### 1. INTRODUCTION

We define straight homotopy invariants of maps and give their characterization, which reduces them to the classical homology theory.

**The group  $L(X, Y)$ .** For a set  $X$ , let  $\langle X \rangle$  be the (free) abelian group with the basis  $X^\# \subseteq \langle X \rangle$  endowed with the bijection  $X \rightarrow X^\#, x \mapsto \langle x \rangle$ . For sets  $X$  and  $Y$ , let  $L(X, Y) \subseteq \text{Hom}(\langle X \rangle, \langle Y \rangle)$  be the subgroup generated by the homomorphisms  $u$  such that  $u(X^\#) \subseteq Y^\# \cup \{0\}$ . (Elements of  $L(X, Y)$  are the homomorphisms bounded with respect to the  $\ell_1$ -norm.) A map  $a: X \rightarrow Y$  induces the homomorphism  $\langle a \rangle \in L(X, Y)$ ,  $\langle a \rangle(\langle x \rangle) = \langle a(x) \rangle$ .

**Straight homotopy invariants.** Let  $X$  and  $Y$  be spaces. Let  $C(X, Y)$  be the set of continuous maps  $X \rightarrow Y$  and  $[X, Y]$  be the set of their homotopy classes. For  $a \in C(X, Y)$ , let  $[a] \in [X, Y]$  be the homotopy class of  $a$ . Let  $M$  be an abelian group, and  $f: [X, Y] \rightarrow M$  be a map (a homotopy invariant). The invariant  $f$  is called *straight* if there exists a homomorphism  $F: L(X, Y) \rightarrow M$  such that  $f([a]) = F(\langle a \rangle)$  for all  $a \in C(X, Y)$ .

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