BULLETIN OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 77, Number 6, November 1971

HOMOTOPY TYPES OF SOME PL COMPLEXES[1]

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Communicated by E. H. Brown, June 1, 1971

Let PL_n represent the semisimplicial group of germs of piecewise linear (PL), origin-preserving homeomorphisms of R^n. Since this is the structure group for n-dimensional PL-bundles ([9], [8]), knowledge of its homotopy type is important for classifying PL structures. Beautiful work has been done in the stable range, making the intrinsic relations between differentiable, piecewise linear and topological categories very clear, but very little is known in the nonstable case. Kuiper and Lashof [8] have treated the nonstable results from a unified point of view.

The purpose of this note is to announce the computation of the homotopy groups of certain PL embedding spaces and the determination of the homotopy types of PL_2 and PL_3 based on the techniques developed in [8]. Some applications are also indicated.

The author wishes to express his gratitude to many people, among whom he is especially pleased to mention J. Milnor, M. Kato, C. Rourke and I. Tamura, for helpful, stimulating, and encouraging discussions and conversations.

We will work in the piecewise linear category. We denote as usual by Δ_k, S^m, I^p, ∂I^p and O_n the standard k-simplex, m-sphere, p-cube, the boundary of the p-cube and the semisimplicial (s.s.) n-dimensional orthogonal group respectively. Let $\mathcal{E}(I^p, I^p \times S^n)$ denote an s.s. complex whose typical k-simplex is a k-isotopy $f: \Delta_k \times I^p \to \Delta_k \times I^p \times S^n$ satisfying:

(i) $f \mid \Delta_k \times \partial I^p = \text{identity}$,

(ii) f is extendable to $\Delta_k \times I^p \times S^n$ as a k-isotopy.

Here $\Delta_k \times \partial I^p$ is identified with $\Delta_k \times I^p \times q$, where q is the base point of S^n.

THEOREM.[2] $\pi_i(\mathcal{E}(I^p, I^p \times S^n)) \cong \pi_{i+p}(S^n)$ *for*

(a) $p = 1$ *and all* n,

AMS 1970 *subject classifications.* Primary 57C50, 57C35, 55F60, 55D15, 57D50, 57E05.

Key words and phrases. Piecewise linear, k-isotopy, semisimplicial complex, homotopy equivalence, R^n-bundle.

[1] The work announced here is contained in the author's doctoral thesis submitted to M.I.T.

[2] This contradicts the announcement of K. C. Millett.