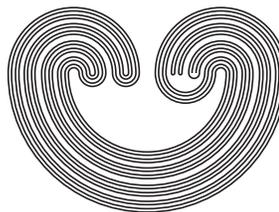


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## HOMOTOPY GROUPS OF INFINITE WEDGE

by

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## HOMOTOPY GROUPS OF INFINITE WEDGE

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ABSTRACT. In *Homotopy Theory* (Pure and Applied Mathematics, Vol. VIII, Academic Press, New York–London, 1959), Sze-tsen Hu proved for  $X \vee Y$ , the wedge sum of pointed spaces  $(X, x_0)$ , and  $(Y, y_0)$  that for  $n \geq 2$  there is an isomorphism

$$(1) \pi_n(X \vee Y, u_0) \approx \pi_n(X, x_0) \oplus \pi_n(Y, y_0) \oplus \pi_{n+1}(X \times Y, X \vee Y, u_0),$$

where  $u_0 = (x_0, y_0)$ .

This result was not generalized for an infinite wedge  $\vee Y_\omega$ ,  $\omega \in \Omega$ , of pointed spaces  $(Y_\omega, y_\omega^0)$  in view of the fact that an infinite wedge  $\vee Y_\omega$  is not a subspace of the direct product  $\prod Y_\omega$ ,  $\omega \in \Omega$ .

In the present work we prove that for  $n \geq 2$  there is an isomorphism

$$\pi_n(\vee Y_\omega, y^0) \approx \sum_{\omega \in \Omega} \pi_n(Y_\omega, y_\omega^0) \oplus \pi_{n+1}(LY_\omega, \vee Y_\omega, y^0),$$

where  $LY_\omega$  is the weak product of pointed topological spaces  $(Y_\omega, y_\omega^0)$ ,  $\omega \in \Omega$  (see C. J. Knight, *Weak products of spaces and complexes*, Fund. Math. **53** (1963), 1–12.)

Let  $\text{Top}_*$  be the category of pointed topological spaces and continuous maps preserving base point [4].

If  $\Omega = \{\omega\}$  is an infinite set and  $\{(Y_\omega, y_\omega^0)\}_{\omega \in \Omega}$  is a family of objects from  $\text{Top}_*$  indexed by  $\Omega$ , their infinite wedge is denoted by  $\vee Y_\omega$  and is defined by  $\bigcup_{\omega \in \Omega} Y_\omega / \bigcup_{\omega \in \Omega} y_\omega^0$  the quotient space of  $\bigcup_{\omega \in \Omega} Y_\omega$  obtained by identi-

fying all of  $\bigcup_{\omega \in \Omega} y_\omega^0$  to a single point  $u^0$ . We define a topology by declaring a subset  $U \subset \bigcup_{\omega \in \Omega} Y_\omega$  to be open if and only if the intersection  $U \cap Y_\omega$  is open in  $Y_\omega$  for all  $\omega \in \Omega$  [1, Definition 2.2.8].

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