Wang, Yi-Sheng
Geometric realization and its variants. (English)


Given a well-pointed topological group $G$, the classifying space $BG$ can be constructed via the geometric realization $|\mathcal{N}G|$ of the nerve $\mathcal{N}G$ of the associated one-object category $\mathcal{G}$ [G. Segal, Publ. Math., Inst. Hautes Étud. Sci. 34, 105–112 (1968; Zbl 0199.26404)]. On the other hand, whether $G$ is well-pointed or not, Milnor’s construction based on the $n$-fold join $G \ast \cdots \ast G$ always yields the homotopy type of $BG$.

Then, by T. tom Dieck [Manuscr. Math. 11, 41–49 (1974; Zbl 0283.55006)] those two constructions (under some conditions) are homotopy equivalent. Milnor’s construction is generalized to topological groupoids by A. Haefliger [Lect. Notes Math. 197, 133–163 (1971; Zbl 0215.52403)] and to categories internal to the category of spaces by Segal [loc. cit.].

The author compares different realization functors for simplicial objects in a topologically enriched model category. Then, the tom T. Dieck’s theorem on homotopy type of classifying spaces is generalized in Theorem 1.1.. The main ingredient in the proof of that result is a generalization of Segal’s lemma [G. Segal, Topology 13, 293–312 (1974; Zbl 0284.55016)] for Top-model categories.

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MSC:

18N50 Simplicial sets, simplicial objects
55R37 Maps between classifying spaces in algebraic topology
55R35 Classifying spaces of groups and $H$-spaces in algebraic topology
57T30 Bar and cobar constructions

Keywords:
classifying space; geometric realization; topologically enriched category

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References:


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