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An example of self homotopy equivalences

Dedicated to Professor Teiichi Kobayashi on his 60th birthday

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1. Introduction.

Let us consider the principal fibre bundle

$$(P,\ q,\ B,\ G) \tag{1.1}$$

with structure group G. G acts on P freely.

Then one can consider the space of (unbased) G-equivariant self-homotopy equivalences of P, which we denote

$$\mathrm{aut}_G(P). \tag{1.2}$$

We define

$$\mathcal{F}_G(P) = \pi_0(\mathrm{aut}_G(P)). \tag{1.3}$$

We call this group the group of G-equivariant self-equivalences of the principal fibre bundle (1.1) (cf. [**4, 5**]).

Also one can consider the space of (unbased) self-homotopy-equivalences of P, which we denote

$$\mathrm{aut}(P). \tag{1.4}$$

We define

$$\mathcal{F}(P) = \pi_0(\mathrm{aut}(P)). \tag{1.5}$$

We call this group the group of self-equivalences of the space P.

We have a natural homomorphism from (1.3) to (1.5) forgetting the G-action

$$\mathcal{F}_G(P) = \pi_0(\mathrm{aut}_G(P)) \longrightarrow \pi_0(\mathrm{aut}(P)) = \mathcal{F}(P), \tag{1.6}$$

induced by the inclusion $\mathrm{aut}_G(P) \to \mathrm{aut}(P)$.

In [**3**, Problem 13, p. 206] the author has raised the following problem in 1988: when is the homomorphism (1.6) a monomorphism.

At this point no examples are known, where this homomorphism is not a monomorphism.