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FIBRATIONS OVER DOUBLE MAPPING CYLINDERS

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1. Introduction

In the diagram of topological spaces

(1.1)
$$\begin{tikzcd} & E_1 \\ E_B \arrow[ur, "j"] \arrow[r, "j_B"] \arrow[d, "p_B"'] & E \arrow[u, "p_1"'] \arrow[d, "p"] \\ B \arrow[r, "\beta"] & M \end{tikzcd}$$

let $p: E \to M$ be a Hurewicz fibration, E_B obtained from p by pullback along $\beta: B \to M$, p_1 an arbitrary map and $j = p_1 j_B$. Let $\mu: \mathscr{M}(p_B, j) \to \mathscr{M}(p, p_1)$ denote the map which is induced on double mapping cylinders.

In this paper we study the map μ when the base space M is a homotopy pushout:

(1.2)
$$\begin{tikzcd} B \arrow[r, "\beta"] & M \\ C \arrow[u, "g"] \arrow[r, "f"'] \arrow[ur, phantom, "F"] & A \arrow[u, "\alpha"'] \end{tikzcd}$$

Let $p_A: E_A \to A$ be the pullback of p over A and $f * p_A$ the fiberwise join of f and p_A. We prove:

THEOREM 1.3. *There is a map $W: E(f * p_A) \to \mathscr{M}(p_B, j)$ such that the following homotopy commutative square is a homotopy pushout.*

$$\begin{tikzcd} E(f * p_A) \arrow[r, "W"] \arrow[d] & \mathscr{M}(p_B, j) \arrow[d, "\mu"] \\ A \arrow[r] & \mathscr{M}(p, p_1) \end{tikzcd}$$

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