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EQUIVARIANT ISOTOPIES OF SEMIFREE G-MANIFOLDS

Dedicated to Professor Minoru Nakaoka on his sixtieth birthday

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1. Introduction

In the previous paper [3] we studied the set of equivariant isotopy classes of equivariant smooth embeddings of a sphere with semifree linear action into a euclidean representation space. In this paper we will study more general case, i.e., the set of equivariant isotopy classes of equivariant smooth embeddings of a manifold into another manifold, where the manifolds in question have a smooth semifree action.

Let G be a compact Lie group, and M, N smooth G-manifolds. Two smooth G-embeddings f and g of M into N are called *G-isotopic*, if there is a smooth G-map

$$H\colon M\times[0, 1]\to N$$

such that, for any $t\in[0, 1]$, $H_t=H\,|\,M\times\{t\}$ is a smooth G-embedding, and that $H_0=f$, $H_1=g$. Such H is called a *smooth G-isotopy* between f and g. The *G-isotopy class* $[f]$ is the set of all smooth G-embeddings G-isotopic to f. Denote by $\mathrm{Iso}^G(M, N)$ the set of all G-isotopy classes of smooth G-embeddings of M into N. Fix a smooth G-embedding f of M into N, and denote by $\mathrm{Iso}^G_f(M, N)$ the set of all G-isotopy classes of smooth G-embeddings G-homotopic to f. If N is a euclidean representation space of G, then N is G-contractible, and then

$$\mathrm{Iso}^G_f(M, N)=\mathrm{Iso}^G(M, N)$$

for any smooth G-embedding f of M into N.

For $x\in M$ denote by G_x the isotropy subgroup of G at x. An action of G on M is called *semifree* if, for any $x\in M$, G_x is either trivial or is all of G. If, moreover, the fixed point set

$$M^G=\{x\in M\,|\,G_x=G\}$$

is neither empty nor is all of M, the action is called *properly semifree*. For $x\in M^G$ denote by M^G_x the connected component of M^G containing x. Choose