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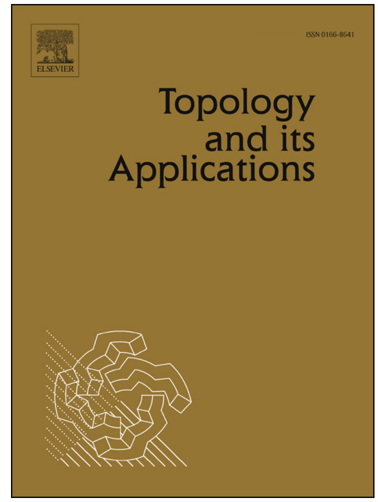

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OBSTRUCTION THEORY FOR COINCIDENCES OF MULTIPLE MAPS

THAÍS MONIS AND PETER WONG

ABSTRACT. Let $f_1, ..., f_k : X \to N$ be maps from a complex X to a compact manifold N, $k \geq 2$. In previous works [1, 15], a Lefschetz type theorem was established so that the non-vanishing of a Lefschetz type coincidence class $L(f_1, ..., f_k)$ implies the existence of a coincidence $x \in X$ such that $f_1(x) = ... = f_k(x)$. In this paper, we investigate the converse of the Lefschetz coincidence theorem for multiple maps. In particular, we study the obstruction to deforming the maps $f_1, ..., f_k$ to be coincidence free. We construct an example of two maps $f_1, f_2 : M \to T$ from a sympletic 4-manifold M to the 2-torus T such that f_1 and f_2 cannot be homotopic to coincidence free maps but for *any* $f : M \to T$, the maps f_1, f_2, f are deformable to be coincidence free.

1. Introduction

The celebrated Lefschetz coincidence theorem states that for any two maps $f, g : M \to N$ between closed connected oriented triangulated n-manifolds, if the Lefschetz coincidence number (trace) $L(f, g)$ is non-zero then the coincidence set $C(f, g) = \{x \in M \mid f(x) = g(x)\}$ must be non-empty. However, the converse does not hold in general. In this direction, E. Fadell showed [5] that if N is simply-connected then the vanishing of $L(f, g)$ is sufficient to deform the maps $f \sim f', g \sim g'$ so that $C(f', g') = \emptyset$. For non-simply connected N, the vanishing of the Nielsen number $N(f, g)$ often provides the converse. Following [5] and [6], it was shown in [9] that the (primary) obstruction $o_n(f, g)$ $(n \geq 3)$ to deforming f and g to be coincidence free is Poincaré dual to the twisted Thom class of the normal bundle of the diagonal $\Delta(N)$ in $N \times N$ with appropriate local coefficients.

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