COINCIDENCE THEORY FOR INFINITE DIMENSIONAL MANIFOLDS

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Communicated by S. Smale, January 9, 1968.

1. **Introduction.** The classical Lefschetz fixed point theorem states that with each compact self-mapping f of a metrizable ANR one can associate a number $L(f)$, the Lefschetz number of f, such that if $L(f)$ is nonzero, f has a fixed point.

If the ANR in question happens to be a smooth Banach manifold and f a smooth map with isolated fixed points, we can attach to each fixed point an index equal to ± 1 or zero, and the sum of these indices is equal to $L(f)$. In other words, $L(f)$ is the algebraic number of fixed points of f. See [**1**, §11].

Here we announce a coincidence point theorem for certain classes of Banach manifolds and certain classes of maps, which extends the Lefschetz-Fuller coincidence theorem [**3**] and which specializes to give the Lefschetz fixed point theorem for Banach manifolds. The theorem is formulated in terms of an $(\infty - p)$-dimensional cohomology theory for certain Banach manifolds.

These results form part of the author's Cornell doctoral dissertation, written under the direction of J. Eells. Full details will appear elsewhere. We use notation and terminology of [**1**].

2. **$(\infty - p)$-dimensional cohomology.** In what follows, E will denote a C^∞-smooth, separable Banach space. *All Banach manifolds in consideration will be C^∞-smooth, paracompact and such that their tangent bundles admit a reduction to $GL_c(E)$.*

A basic tool is the following generalization of a lemma of Palais-Švarc [**1**, §1]:

THEOREM 1. *Let X be a Banach manifold. Then there exists a nested sequence of closed submanifolds $\{X_n\}_{n\geq 1}$: $X_n \subset X_{n+1}$, $\dim X_n = n$, such that if $X_\infty = \bigcup_{n\geq 1} X_n$ with the direct limit topology, the natural inclusion map $i_\infty: X_\infty \to X$ is a homotopy equivalence.*

Given a Banach manifold X, choose a system $X_1 \subset X_2 \subset \cdots \subset X_n \subset \cdots \subset X$ as described in Theorem 1. For any abelian group we define the $(\infty - p)$-dimensional cohomology of X with compact supports with coefficients in G, denoted by $H_c^{\infty - p}(X, G)$, as follows: for all $n \geq p \geq 0$, we have

$$\alpha: H_c^{n-p}(X_n; G) \to H_c^{n+1-p}(X_{n+1}; G)$$