Werk

Titel: Manifolds and Cell Complexes

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57 Manifolds and Cell Complexes

57001
Birman, Joan S.; Hilden, Hugh M.:
On isotopies of homeomorphisms of Riemann surfaces.
Ann. of Math., II. Ser. (to appear).

Let X and $\underline{X}$ be orientable surfaces, and let $(p,X,\underline{X})$ be a regular covering space, possibly branched, with a finite number of sheets and branch points. Let g be a fiber-preserving homeomorphism of X, and let $\underline{g} = pgp^{-1}$ be the projection of g to $\underline{X}$. This paper studies the relationship between isotopies of g and isotopies of $\underline{g}$. Theorem 1: Suppose that the covering $(p,X,\underline{X})$ has the property that every covering transformation keeps the branch points individually fixed. If the covering is branched, assume that X is not the closed sphere or torus. Suppose that the homeomorphism g is isotopic to the identity. Then there is an isotopy g_t between g and the identity map such that for every $0 \le t \le 1$ the isotopy g_t preserves fibers. Theorem 2: Let the covering $(p,X,\underline{X})$ have a solvable group of covering transformations. Suppose that the homeomorphism g is isotopic to the identity. Then its projection $\underline{g}$ is also isotopic to the identity, however the isotopy of $\underline{g}$ may not preserve fibers. Let $\mathfrak{M}(T_{g,n})$ be the mapping class group of a surface $T_{g,n}$ of genus g with n points removed, that is the group of all homeomorphisms of $T_{g,n}$ modulo the subgroup of those homeomorphisms which are isotopic to the identity. Let $(p,T_{g,n},\underline{X})$ satisfy the hypotheses of Theorem 1. Let $\mathfrak{M}_p(T_{g,n})$ be the subgroup of $\mathfrak{M}(T_{g,n})$ which is generated by the isotopy classes of lifts of homeomorphisms from $\underline{X}$ to $T_{g,n}$. Theorem 1 is applied to study the groups $\mathfrak{M}_p(T_{g,n})$. An example of the type of result obtained is the following: Theorem 4: The subgroups $\mathfrak{M}_p(T_{g,n})$ may be described algebraically as the normalizers of the cyclic subgroups generated by all elements of finite order in $\mathfrak{M}(T_{g,n})$. If the situation above is further restricted to branched coverings of the closed sphere by a Riemann surface $T_{g,0}$, where ramification is over n points of the sphere, and if $\mathcal{J}$ is the subgroup of $\mathfrak{M}(T_{g,0})$ generated by the covering transformations, then one obtains: Theorem 5: $\mathfrak{M}(T_{g,0})/\mathcal{J}$ is isomorphic to $\mathfrak{M}(T_{0,n})$. Autorreferat.

57002
Voxman, William:
Decompositions of 3-manifolds and pseudo-isotopies.
Trans. Amer. math. Soc. 164, 503-508 (1972).

In his thesis [On the shrinkability of decompositions of 3-manifolds, Iowa Univ. 1968; see also Trans. Amer. math. Soc. 150, 27-39 (1970, this Zbl. 198, 563)] the author proved that cellular decompositions of a 3-manifold which have the same manifold for their decomposition space may be realized by pseudo-isotopy. In this paper the author gives a short proof of that theorem and, in addition, he proves that one may exercise considerable control over the pseudo-isotopy.
R. J. Bean.

57003
Cannon, James W.:
***-taming sets for crumpled cubes. I: Basic properties. II: Horizontal sections in closed sets. III: Horizontal sections in 2-spheres.**
Trans. Amer. math. Soc. 161, 429-440, 441-446, 447-456 (1971).

It has long been known that the union two tame subsets of E^3 need not be tame. If the sets are compact and the intersection is a single point the union may be wild, as Example 1.4 of Fox-Artin shows. In 1952 Moise showed that a disk D, locally polyhedral mod p, p and interior point of D, and a straight line segment L have a union that is tame, where L pierces D at p. The reviewer showed, using

Bing's approximation theorem that if a polygonal simple closed curve k bounds any disk, it bounds a polyhedral disk (1956). Since this time a great deal of information has become available about 3-space topology by the use of Dehn's lemma, and, more recently by the use of Bing's side approximation theorem, in particular, the fact that every disk contains many tame arcs and that every topological 2-sphere contains many tame Sierpinski curves make strong use of the side approximation theorem. Unfortunately, certain notations such as (*,M,S), (A,M,S), (B,M,S) have crept into the literature with about as many meanings as there are authors. In general (A,B,C) is a logical property defining some geometric property of an embedding in three-space in relation to the pair of sets B and C, where B is usually a subset of C but occasionally B is disjoint to C. Partly as a result of this confusion of notation some old results are rediscovered periodically. The author of the present triple of papers attains interesting new results and makes a capital effort to eliminate the inconsistencies in notations mentioned above. I: The concept of taming set is due to Burgess and reads as follows: Let X be a closed subset of a topological 2-sphere in E^3 such that if S' is any topological 2-sphere in E^3 containing X that is locally tame mod X, then S' is tame; such an X is called a taming set. The concept of *-taming set is due to J. W. Cannon and reads as follows: A *-taming set X in E^3 is a closed subset of E^3 having the following property: If C is a crumple cube in E^3, $X \subset C$, and Bd C is locally tame mod $X \cap \mathrm{Bd}\, C$, then C* is a 3-cell. It is understood C* is the complementary crumpled cube to C. These concepts have been referred to considerably by C. E. Burgess and J. W. Cannon in their expository paper in Rocky Mountain J. Math. 1, 259-344 (1971, this Zbl. 227.55004). The proofs of many results referred to above are given here for the first time. Two of the most useful results are: Corollary 3.8. If X is a compact subset of a 2-sphere S in E^3, then X is a *-taming set if and only if X is tame and has no degenerate components (i.e., if and only if X is a taming set). Theorem 3.10. If C and K are homeomorphic crumpled cubes in E^3, X is a *-taming set in C and $h: C \to K$ a homeomorphism, then the following are equivalent: (1) $K^* \setminus h(X)$ is 1-ULC, (2) X and h(X) are equivalently embedded in E^3, (3) h(X) is a *-taming set.
II: The author continues his study of *-taming sets (a notion similar to taming set (see above) but results from removing the restriction that X lie on a surface in E^3). He proves that a closed subset X of E^3 is a *-taming set if no horizontal section of X has a degenerate component. This implies that a 2-sphere S in E^3 is tame if no horizontal section of S has a degenerate component. He then shows that a topological 2-sphere S is tame if it can be touched at each point from each side of S by a pencil (problem of R. H. Bing solved by Loveland with contributions by H. C. Griffith and others).
III: By using the results accumulated in parts I and II the author established the following: Theorem. Let S denote a 2-sphere in E^3. (1) If each horizontal section of S has at most finitely many components that separate S, then the wild set W(S) of S lies in a closed 0-dimensional set of horizontal levels, hence is tame by the part II, and therefore at most 1-dimensional. (2) If, in addition, each horizontal section of S has at most countably many degenerate components, then the set of non-piercing points is countable and the closure of Y equals W(S). In particular, if Y is empty then S is tame. (3) If the hypothesis of (2) is satisfied and S has local horizontal separation index less than 5 at each degenerate component of each horizontal section of S, then the set of non-piercing points of S is empty and S is tame. (4) If there is a positive integer n such that each horizontal section of S has at most n components that separate S, then each horizontal section of S has at most finitely many components and (2) applies. (5) If, in (4), $n < 5$, then (3) applies and S is tame. (6) If, in (4), $n = 5$, then $S \cup \mathrm{Int}\, S$ is a 3-cell and S is tame modulo two points. O. G. Harrold.

57004
Doyle, P. H.:
On compact subsets of an n-manifold.
Portugaliae Math. 31, 179-181 (1972).
The paper deals with the relationship between invertibility and geometric triviality. Results are obtained showing that in higher dimensions for triangulated manifolds $(n-2)$-invertibility is the same as geometric triviality in dimension $n-2$. The Lusternik-Schnirelmann category of various manifolds is investigated. It is shown that a topological closed three-manifold with a residual set that is a topologically imbedded graph must be a three-sphere. Autorreferat.

57005
Štan'ko, M. A.:
Approximation of imbeddings of compacta in codimensions greater than two.
Doklady Akad. Nauk SSSR 198, 783-786 (Russisch) (1971), engl. Übersetzung in Soviet Math., Doklady 12, 906-909 (1971).
The following theorem is the main result of the paper: Given a compactum $K \subset E^n$, $\dim K \leq n-3$ and an $\varepsilon > 0$, there is an ε-displaced homeomorphism $f_\varepsilon : K \to E^n$ such that $E^n \setminus f_\varepsilon(K)$ has the 1-ULC property. It follows from this theorem and from the earlier results of the author [Doklady Akad. Nauk SSSR 186, 1269-1272 (1969, this Zbl. 186, 576)] that the Menger compactum M_r^n $(r<n)$ is universal for all r-dimensional compacta lying in E^n. Another corollary from the main theorem is the following approximation theorem, which has been proved by other methods by R. T. Miller [Ann. of Math., II. Ser. 95, 406-416 (1972, this Zbl. 208, 518)]: If M^k is a PL-manifold arbitrarily embedded in E^n, $k \leq n-3$, then for every $\varepsilon > 0$ there exists an ε-displaced homeomorphism $h : M^k \to E^n$ such that $h_\varepsilon(M^k)$ is a PL-submanifold of E^n. H. Patkowska.

57006
Horvath, Raymond:
Normal bundles of topological manifolds.
Indian J. Math. 12, 117-124 (1970).
In this paper the following two theorems are proved: Theorem 3.1. Let M and N be closed, connected topological manifolds with normal bundles V_M and V_N, respectively. If there exists a map $f : M \to N$ inducing Čech cohomology isomorphism, then $T(V_M)$ and $T(V_N)$ are of the same stable homotopy type, where $T(V)$ is the Thom space of V. Given an R^n-bundle ε, we obtain S^n-bundle $\hat{\varepsilon}$ by taking the one point compactification in each fibre. Theorem 3.2. Let $M \subset R^m$ and $N \subset R^n$ be closed, connected topological manifolds, and let $f : M \to N$ be a homotopy equivalence. Then if ε respectively V is the normal bundle of M resp. N, $f^*(\hat{V}) \underset{sf}{\sim} \hat{\varepsilon}$, where $\underset{sf}{\sim}$ denotes stable fibre homotopy equivalence. This theorem is a topological analogue of Theorem 3.6 in M. F. Atiyah's paper in Proc. London math. Soc., III. Ser. 11, 291-310 (1961, this Zbl. 124, 163). M. Adachi.

57007
Strutt, Joseph:
Projective homotopy classes of Stiefel manifolds.
Canadian J. Math. 24, 465-476 (1972).
A homotopy class in $[S^n, X]$ is projective if it factors through RP^n via the standard map $S^n \to RP^n$. The author proves that every element of $\pi_n(X) = [S^n, X]$ is projective if X is the Stiefel manifold $V_{7,3}$ or $V_{7,4}$. This proves, via results of P. Zvengrowski [J. London math. Soc., II. Ser. 3, 625-632 (1971, this Zbl. 214, 504)] that every r-field on S^7 is homotopic to a skew-linear r-field, $r = 3$ or 4. P. Rice.

57008
Feder, S.:
The reduced symmetric product of projective spaces and the generalized Whitney theorem.
Illinois J. Math. 16, 323-329 (1972).
The author gives a simple way of computing the cohomology structure of the reduced symmetric product of a projective space (real or complex), which can be used to study embedding problems for these spaces. In particular, he proves that the regular homotopy classes of embeddings $RP^k \subset R^{2k}$ coincide with isotopy classes of embeddings when k is even greater than 2, and such classes are in one-to-one correspondence with the integers. P. Rice.

57009
Stefani, Gianna:
Osservazioni sui gruppi di Aeppli.
Atti Sem. mat. fis. Univ. Modena 20(1971), 146-152 (1972).
This paper is all about some simple remarks on Aeppli groups. Aeppli groups have been recently studied by some authors and they are really interesting in the study of algebraic cycles of an algebraic manifold. In it the author proves that Aeppli groups can be regarded as E_2 terms of a spectral sequence associated with a resolution of $\mathcal{A}^{p,0}[\mathcal{A}^{0,q}]$, where $\mathcal{A}^{p,0}[\mathcal{A}^{0,q}]$ is the sheaf of $(p,0)[(0,q)]$-forms ω such that $d\omega = 0$. Using Hodge's usual operators the following results due to B. Bigolin are proved: Aeppli groups of compact Kählerian manifolds are isomorphic to Dolbeault groups. Moreover as a consequence of an exact sequence due to B. Bigolin the cohomology of a compact Kählerian manifold is calculated at values in the sheaf of pluriarmonic (p,q)-form. Autorreferat.

57010
Faust, D. D.:
The existence of polar non-degenerate functions on a topological manifold.
Commentationes math. Univ. Carolinae 13, 149-161 (1972).
The author proves the theorem: If F is a non-degenerate function on a connected n-dimensional topological manifold M with m critical points, $u+1$ of index zero and $v+1$ of index n, then there exists a polar non-degenerate function F* with $m-2u-2v$ critical points such that F* is identical with F in some neighborhood of each of F*'s critical points. This theorem, announced but not proved by M. M o r s e [J. Analyse math. 7, 189-208 (1959, this Zbl. 96, 306)] is proved by reduction to the C^∞ case, which is well known. P. Rice.

57011
Edwards, C. H. jun.:
Piecewise linear embeddings of bounded manifolds.
Michigan math. J. 19, 21-32 (1972).
The author generalizes a theorem of J. F. P. H u d s o n [Piecewise linear topology (1969, this Zbl. 189, 545), Theorem 8.2] that if $f: M \to Q$ is a proper PL embedding, then f is homotopic to a proper PL map of pairs $(M,\delta M) \to (Q,\delta Q)$ provided $(M,\delta M)$ is $2m-q$ connected and $(Q,\delta Q)$ is $2m-q+1$ connected. The author relaxes the last hypotheses and assumes only that $(Q,\delta Q)$ is $2m-q$ connected and that $f_*: \pi_{2m-q+1}(M,\delta M) \to \pi_{2m-q+1}(Q,\delta Q)$ is an epimorphism. At a key point in the proof it is required that $q \geq m+4$. Several engulfing arguments are used. The singular sets of a composition of maps become entangled and the codimension restrictions become important. In the last section a corresponding unknotting theorem is obtained. O. G. Harrold.

57012
Kobayashi, Kazuaki:
On homotopically trivial links.
J. Fac. Sci., Hokkaido Univ., Ser. I 22, 74-78 (1972).

A PL link $(S^n, K_1^k \cup K_2^k)$ of two copies of S^k in S^n is said to be homotopically trivial if K_i^k is contractible in the complement of K_j^k, $(i,j) = (1,2),(2,1)$, and geometrically trivial if there exist disjoint PL locally flat $(k+1)$-cells B_1^{k+1}, B_2^{k+1} in S^n such that $\partial B_i^{k+1} = K_i^k$, $i = 1,2$. In the range $k+3 \le n \le (3k+3)/2$, there exist homotopically trivial links which are not geometrically trivial. Stating that there is no proof of this fact, the author defines another geometric condition on $(S^n, K_1^k \cup K_2^k)$, $n \ge k+3$, and the main result of the paper is that this condition implies geometric triviality. The whole problem of linking spheres, however, has already been discussed in considerable detail by A. H a e f l i g e r [Commentarii math. Helvet. 41, 51-72 (1966, this Zbl. 149, 208)]; in particular the above-mentioned difference between homotopic and geometric triviality follows from his results. C. McA. Gordon.

57013
Reyner, Steven W.:
A correction to metacyclic invariants of knots and links.
Canadian J. Math. (to appear).

Theorem 1 of the paper of R. H. F o x in Canadian J. Math. 22, 193-201 (1970, this Zbl. 195, 540) is incorrect. A counterexample is given, together with a proof of a revision of the theorem. Autorreferat.

57014
Roberts, R. S.:
Equivariant integrality theorems for differentiable manifolds.
Proc. Cambridge philos. Soc. 72, 189-200 (1972).

In differential topology it is useful to be able to find restrictions on the possible real or complex vector bundles over a given manifold. Integrality theorems give rise to such restrictions, being in the non-equivariant case the statement that some specific rational multinomial in the various characteristic classes is an integral multiple of the fundamental cocycle. In 1965, K. H. M a y e r [Topology 4, 295-313 (1965, this Zbl. 173, 259)] proved two powerful integrality theorems on real vector bundles, which can be used to establish the impossibility of certain embeddings and immersions. The author generalises the first of Mayer's theorems to the case when there is a smooth action of a finite cyclic group of odd order on the manifold and on a real vector bundle over the manifold. The proof involves an application of an equivariant integrality theorem which was proved by M. F. Atiyah at a seminar on K-theory and representation theory held at Oxford University in the summer of 1965. Earlier integrality theorems can be deduced from Atiyah's result by suitable selection of a virtual complex vector bundle. The author uses spin representations to construct equivariant bundles of spinors, and from these is formed an equivariant virtual complex vector bundle to which is applied Atiyah's theorem. The restriction to a cyclic group of odd order avoids problems concerning non-orientable manifolds and the consequent necessity to use twisted cohomology. Use is also made of the fact that the cyclic group has odd order in the construction of an equivariant spin structure, and for technical reasons it is necessary to be able to take unique square roots in the group. The author's theorem gives rise to restrictions on the characteristic classes of an equivariant real vector bundle over a smooth manifold, and application to normal bundles should demonstrate the impossibility of some equivariant immersions. Autorreferat.

57015
Osborn, Howard:
Representations of Euler classes.
Proc. Amer. math. Soc. 31, 340-346 (1972).
Let M be any smooth manifold. We denote by E the $C^\infty(M)$-module of differentials on M, i.e., the smooth sections of the cotangent bundle. Let (Λ^*E,d) and $H^*(M)$ be the de Rham complex and de Rham cohomology of M and let R be the even-dimensional subring $\Lambda^{2*}E \subset \Lambda^*E$. If F is the $C^\infty(M)$-module of smooth sections of any oriented 2n-plane bundle ξ over M, then any connection in ξ may be regarded as a real linear map $D : \Lambda^*E \otimes F \to \Lambda^*E \otimes F$ for which the curvature is Λ^*E-module endomorphism $D \circ D$ of degree 2. We conclude that the curvature induces an R-linear endomorphism $K : T \to T$ for $T = R \otimes F$. The orientation of ξ induces an orientation of T, and any Riemannian metric on ξ induces an inner product on T. In the present article has been proved that $(4\pi)^{-n}$ pfK presents the Euler class. G. Tsagas.

57016
Smith, Larry:
On characteristic numbers of almost complex manifolds with framed boundaries: A correction.
Topology 11, 323 (1972).
A correction of proposition 3.6 of the author's paper in ibid. 10, 237-256 (1971, this Zbl. 194, 554) is given.

57017
Durfee, Alan H.; Lawson, H. Blaine jun.:
Fibered knots and foliations of highly-connected manifolds.
Inventiones math. 17, 203-215 (1972).
Vgl. das Autorreferat (Voranzeige) in diesem Zbl. 231.57015.

57018 □
Nathan, William D.:
Open mappings into a 1-manifold.
Proc. first Conf. monotone Mappings open Mappings 1970, State Univ. New York, Binghamton, 322-342 (1971).
[This article was published in the book announced in this Zbl. 225.54009.]
The author investigates open maps $f : M^n \to N^1$ from an n-manifold into a 1-manifold. He proves that if f is C^n and open $f^{-1}(y)$ has finitely many components (bounded if $N^1 = S^1$), $H_{n-1}[f^{-1}(y);Z]$ is torsion free and $H^{n-1}[f^{-1}(y);Z_2]$ has finite dimension. For the case $n = 2$, he presents several examples. He defines a singular set for f, S_f to be those points in M^n lying in components of $f^{-1}(y)$ such that inclusion into a component of $f^{-1}(U)$, U a neighborhood of y does not induce an isomorphism. If M^2 is the torus, $S_f = \emptyset$. If f is C^2 and proper, S_f is discrete. He defines exceptionality and proves an Euler characteristic formula.
W. L. Reddy.

57019 □
Gromov, M. L.:
A topological technique for the construction of solutions of differential equations and inequalities.
Actes Congr. internat. Math. 1970, 2, 221-225 (1971).
[Dieser Artikel erschien in dem in diesem Zbl. 219, 1 angezeigten Sammelwerk.]
Wir betrachten Differentialgleichungen als Teilmengen $\Omega \subset X^r$, wobei X ein Faserraum über einer Mannigfaltigkeit M und X^r die Menge aller r-Jets lokaler Schnitte über M in X ist. B bezeichnet die Menge aller C^s-Schnitte über M in Ω, A die Menge aller C^{r+s}-Schnitte, deren r-Jets in Ω liegen und $J : A \to B$ die Abbildung, die jedem Schnitt $\sigma : M \to X$ mit $\sigma \in A$ den Schnitt $y \in M \to j_y^r\sigma \in \Omega$ zuordnet. Die Untersuchung der auf den Homotopiegruppen $\pi_i(A)$ bzw. $\pi_i(B)$ $(i > 0)$ induzierten Ab-

bildung J_* führt zu einigen globalen Resultaten über Immersionen $M \to N$ von Mannigfaltigkeiten, durch die gewisse geometrische Objekte auf M (z.B., Riemannsche Metriken, Zusammenhänge) durch andere, auf N gegebene Objekte ähnlicher Art induziert werden. Die Arbeit gibt nur einen knappen Überblick über diese Resultate und die verwendeten Methoden. H. Gollek.

57020
Koriyama, Akira:
On canonical stratifications.
Kōdai math. Sem. Reports 24, 146-167 (1972).

Let V be the subset of $M(n,m)$ consisting of all matrices of rank $r<n$ (for simplicity we assume $n \leq m$). Then V is an algebraic set and by making use of ranks of matrices we have a stratification of V, which is called the canonical stratification. On the other hand, every polynomial can be expressed in a form of determinant of a certain square matrix whose entries are monomials of degree 1 or 0. Hence every closed connected smooth manifold can be imbedded into $M(n,n)$ for some n and is expressed as the intersection of the q affine m-spaces and $\det^{-1}(0)$ in $M(n,n)$, where q and m depend on the given manifold. The main purpose of this paper is to study and describe explicitly the canonical stratification of V. The results are the following. Theorem A. Let K and L be the manifolds $M(n,m;r)$ and $M(n,m;s)$, respectively, for $s>r\geq 1$. Then there exists a tubular neighborhood T_K of K in $K \cup L$ and (T_K,p,K,F) becomes a fibre bundle. Here F is the cone over the manifold $S^{(n-r)(m-r)-1} \cap M(n-r,m-r;s-r)$ from the origin. Theorem C. The manifold $S^{nm-1} \cap M(n,m;r)$ is homeomorphic to $V_{n,r} \times_G \Lambda_{m,r}$, where $V_{n,r} \times_G \Lambda_{m,r}$ is the orbit space of $G=\{T \mid T=(t_{ij}) \in O(r),\ t_{ij}=\pm\delta_{ij}\}$ under the action defined by $T \circ (E,B)=(ET,TB)$ for (E,B) of $V_{n,r} \times \Lambda_{m,r}$. Corollary.

$$(S^{nm-1} \cap M(n,m;1),p,P^{n-1},S^{m-1})$$

is a fibre bundle over the real projective space P^{n-1} with fibre S^{m-1}.

Autorreferat.

57021
Vranceanu, George:
Sopra le funzioni di Morse degli spazi lenticolari.
Atti Accad. naz. Lincei, VIII. Ser., Rend., Cl. Sci. fis. mat. natur. 51(1971), 497-499 (1972).

On obtient des fonctions de Morse très simples sur chaque espace lenticulaire, et on détermine leurs points critiques. Zusammenfassung des Autors.

57022
Ishimoto, Hiroyasu:
Representing handlebodies by plumbing and surgery.
Publ. Res. Inst. math. Sci., Kyoto Univ. 7, 483-510 (1972).

This paper studies handlebodies W of the form $W=D^m \bigcup_{\{f_i\}} \left\{ \bigcup_{i=1}^{r} D_i^n \times D_i^{m-n} \right\}$. If $2m \geq 3n+3$, it follows from a result by Haefliger that W is determined by the linking elements $\lambda_{ij} \in \pi_{n-1}S^{m-n-1}$ $(i \neq j)$, where λ_{ij} is obtained in a natural way from the imbedding $f_j(S_j^{n-1} \times 0) \subseteq S^{m-1} - f_i(S_i^{n-1} \times 0)$. Alternatively, let D_i be n-disks in D^m which meet ∂D^m transversally in $\partial D_i = f_i(S_i^{n-1} \times 0)$. We may assume that D_i and D_j meet transversally whenever $i \neq j$. Any framing of D_i in D^m restricts to a framing of $D_i \cap D_j$ in D_j and determines a well defined framed cobordism class $\lambda(D_i,D_j)$. Then λ_{ij} and $\lambda(D_i,D_j)$ are the same element when thought of as elements in the stable homotopy group $\pi_{n-1}S^{m-n-1}$. A lemma of Wells implies that if U is any framed manifold in the same framed cobordism class as $\lambda(D_i,D_j)$

then one can isotope D_i to D_i' such that $D_i' \cap D_j = U$. This enables the author to prove his main theorem which characterizes those W for which the λ_{ij} admit as representatives framed manifolds which are either S^{2n-m} or $S^p \times S^q$, $p+q=2n-m$. W then turns out to be a manifold obtained by attaching certain $(2n-m+2)$-handles and 2-handles to a manifold which is the result of a generalized plumbing construction (along spheres or tori) on $(m-n)$-disk bundles over n-spheres. This theorem has an application to the classification of manifolds M^{m-1} which have non-zero homology groups only in dimensions 0, $n-1$, $m-n$, and $m-1$ $(n-1<m-n)$ and for which the normal bundles of the imbedded $(n-1)$-spheres which represent the generators of $H_{n-1}M$ are trivial, because then $M=\Sigma \not\cong \partial W^m$, where Σ is a homotopy $(m-1)$-sphere and W is as above. M. Agoston.

57023
Stong, R. E.:
Equivariant bordism and Smith theory. III.
Trans. Amer. math. Soc. 168, 259-263 (1972).
[For part II of the series see ibid. 162(1971), 317-326 (1972, this Zbl. 223. 57023).] This paper shows that the bordism class of a manifold with involution is determined by means of Wu type classes in the Smith cohomology.
Autorreferat.

57024
Gitler, Samuel:
Durch H-Räume gefaserte Räume.
Bol. Soc. mat. Mexicana, II. Ser. 7, 71-84 (Spanisch) (1962).
An algebra A over a field K is connected if it is graded and $A_0=K$. Let K be of characteristic $p \neq 0,2$. Let A be connected differential algebra. Applying the bar construction to A [J. C. M o o r e, Sympos. internac. Topología algebráica, 232-247 (1958, this Zbl. 89, 180), Périodicité des Groupes d'Homotopie stables des Groupes classiques, d'après Bott, Sém. H. Cartan 12(1959/60), Nr. 7, 37 p. (1961, this Zbl. 115, 172)], the connected differential co-algebra $\bar{B}(A)$ is obtained. If $g: A \otimes A \to A$ is an algebra morphism, then $\bar{B}(A)$ is an Hopf algebra. If g is homotopic to the multiplication in A and H(A) is associative commutative Hopf algebra, then the terms E^r, $r>1$ of the Moore spectral sequence for $\bar{B}(A)$ in homology are associative commutative Hopf algebras such that the differentials d^r are derivations of Hopf algebras. It is also obtained that the terms E_r, $r \geq 1$, of the spectral sequence for $\bar{B}(A)$ in cohomology are commutative Hopf algebras. Let $\pi: E \to X$ be a fibration with E acyclic and with fibre M such that M and X are H-spaces; then the geometric suspension $k_*: H(M) \to H(X)$ coincides with the suspension $\sigma_*: H(M) \to \mathrm{Tor}^{C(M)}(Z_p, Z_p)$. From here the main theorem is deduced: Let X be an H space, let $k_*: Q_q(H_*(\Omega X; Z_p)) \to P_{q+1}(H_*(X; Z_p))$ be the homomorphism induced by the suspension, where $P_{q+1}(H_*(X;Z_p))$ is the loop space of X, Q_q are the indecomposable elements of $H_q(\Omega X, Z_p)$ and P_q is the space of primitive elements. Then k_* is an isomorphism if q is even and $\not\equiv -2 \bmod 2p$ or if q is odd and $\not\equiv 1 \bmod 2p$. F. Botella Raduán.

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Gitler, Samuel:
Eine Bemerkung zur Cartanschen Transpotenz.
Bol. Soc. mat. Mexicana, II. Ser. 7, 85-91 (Spanisch) (1962).
In the introduction the author remarks that the purpose of this paper is as follows: C a r t a n (Algèbres de Eilenberg-MacLane et homotopie, Sém. H. Cartan 1954-55, École norm. sup.) defines the transpotence in the homology of Eilenberg-MacLane spaces, $K(\pi,n)$, thus: $\varphi_p: H_{2q}(\pi,n:Z_p) \to H_{2p+2}(\pi,n+1,Z_p)$, where φ_p is zero on products, it is additive for $p>2$ and takes values in the space of primitive homology classes. The author generalizes this operation as follows. Let $(\Omega X, E, X)$

be the fibration of the loop space over a 1-connected H-space X. Then $\Sigma(X) \subset P(X)$, where $\Sigma(X)$ is space of all suspension elements and $P(X)$ space of primitive elements in $H_*(X;Z_p)$. The generalization of the transpotence is

$$\varphi_{p^r} : K^r_{2q}(\Omega X) \to (P(X)/\Sigma(X))_{2p^r q + 2}$$

which is additive, is zero on products in K^r and is natural with respect to maps $X \to Y$ of H-spaces. The definition of φ_{p^r} is obtained by means of explicit formulae in the bar construction as given in the paper reviewed above.

F. Botella Raduán.