BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 2, Number 3, May 1980

DIFFEOMORPHIC COMPLETE INTERSECTIONS WITH DIFFERENT MULTIDEGREES

BY ANATOLY S. LIBGOBER AND JOHN W. WOOD[1]

A complete intersection $X_n(\mathbf{d}) \subset CP_{n+r}$ of hypersurfaces of degrees $d_1, \ldots, d_r$ is determined up to diffeomorphism by the dimension n and the multidegree which is the unordered r-tuple $\mathbf{d} = (d_1, \ldots, d_r)$. A general problem is to find invariants which determine the diffeomorphism type of X. In this note we announce partial results which allow us to prove that in any odd dimension there are infinitely many pairs of multidegrees for which the corresponding complete intersections are diffeomorphic. This follows from a result characterizing the homotopy type of X under some restrictions, an estimation of the number of differential structures with prescribed Pontryagin classes on a given homotopy type, and a counting argument. Complete proofs of these results will appear elsewhere.

A necessary feature of these examples is a large codimension.

PROPOSITION. *If $2r \leqslant n$ and $n > 2$, all complete intersections diffeomorphic to a given complete intersection of codimension r have the same multidegree, where $(d_1, \ldots, d_r)$ with each $d_i > 1$ may be identified with $(d_1, \ldots, d_r, 1, \ldots, 1)$.*

Let d be the total degree, $d = d_1 \ldots d_r$, and assume $d = \pm 1 \bmod 8$. Let $n = 2m + 1$. Then there is a differentiable connected sum decomposition $X_n(\mathbf{d}) = M_n(\mathbf{d}) \# S^n \times S^n \# \cdots \# S^n \times S^n$ where $M_n(\mathbf{d})$ has the homology of CP_n; this follows from a computation of the Kervaire invariant, see [5]. The cohomology ring structure of $M_n(\mathbf{d})$ is $Z[x, y]/\{x^{m+1} = dy, x^{n+1} = 0\}$ where the dimensions of x and y are 2 and $n + 1$ respectively. We call a simply connected, $2n$-dimensional CW-space M with such a ring structure a d-twisted homology CP_n.

THEOREM 1. *If $n = 2m + 1$ and d has no divisors less than $m + 2$, then any two $2n$-dimensional, d-twisted homology CP_n's are homotopy equivalent.*

As a consequence, with these hypotheses the homotopy type of $X_n(\mathbf{d})$ is determined by n, d, and the Euler characteristic. The theorem follows from a spectral sequence argument which shows M is equivalent to the $2n$-skeleton of the

Received by the editors December 27, 1979.
AMS (MOS) subject classifications (1970). Primary 14M10, 57D55.
[1] The authors were partially supported by the National Science Foundation.

0002-9904/80/0000-0208/$01.75