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ADAMS OPERATIONS ON PRODUCT MANIFOLDS AND THEIR APPLICATIONS

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This dissertation deals with non-immersion, non-embedding problems and the upper bound of the number of linearly independent tangent vector fields of a smooth closed manifold M by using Adams operations on the Grothendieck ring $KO(M)$.

Let p and q be any odd prime numbers. Let $L^{2n+1}(p)$ and $L^{2m+1}(q)$ be the standard lens spaces. We shall compute γ-dimension and γ-codimension of product lens space $L^{2n+1}(p)\times L^{2m+1}(q)$. The main results on this thesis are the following:

THEOREM

$$\operatorname{Span}\ (L^{2n+1}(p)\times L^{2m+1}(q))\leqq 2(n+m+1)-2\max\{k(n,p),k(m,q)\},$$

where $k(n,p)=\max\left\{k \mid k\leqq\left[\frac{n}{2}\right],\ V_p\binom{n+1}{k}<1+\left[\frac{n-2k}{p-1}\right]\right\}$,

$V_p(m)$ denotes the p-adic valuation of m.

THEOREM (i) $L^{2n+1}(p)\times L^{2m+1}(q)$ cannot be immersible in $R^{2(n+m)+1+2\max\{l(n,p),l(m,q)\}}$

(ii) $L^{2n+1}(p)\times L^{2m+1}(q)$ cannot be embeddable in $R^{2(n+m+1)+2\max\{(ln,p),l(m,p)\}}$,

where $l(n,p)=\max\left\{l \mid l\leqq\left[\frac{n}{2}\right],\ V_p\binom{n+l}{l}<1+\left[\frac{n-2l}{p-1}\right]\right\}$.

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