Note on the relations between smooth SU(6)-actions and rational Pontrjagin classes

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0. Introduction and statement of a result

In [4], W.-C. Hsiang and W.-Y. Hsiang investigated smooth actions of classical groups on smooth manifolds with vanishing 1-st rational Pontrjagin classes. After them, E. A. Grove [2] studied smooth $SU(n)$-actions in more detail.

We note that their studies have the restrictions of dimensions of manifolds, and so it is reasonable that we want to remove those restrictions. But, of course, we need another assumption that a group, which acts on a manifold with vanishing 1-st and 2-nd rational Pontrjagin classes, is $SU(6)$. The reason which makes us take $SU(6)$ is only that $SU(6)$ has the classification of its semisimple subgroups in [3].

In this paper, we have all possibilities of identity components of principal isotropy subgroups of $SU(6)$ which acts on a manifold of arbitrary dimension with vanishing 1-st and 2-nd Pontrjagin classes.

THEOREM 0.1

Let $SU(6)$ act smoothly on a smooth manifold with vanishing 1-st and 2-nd rational Pontrjagin classes. Then the type of identity components of principal isotropy groups of this action is one of the followings.

$A_5\,(=SU(6))$,

A_4^1,

$A_3^1,\ A_3^2,\ A_2^1\cdot A_1^1,\ A_1^1\cdot A_1^1\cdot A_1^1$,

$A_2^1,\ A_2^2,\ A_2^5,\ A_1^1\cdot A_1^1,\ A_1^2\cdot A_1^2,\ A_1^4\cdot A_1^4,\ B_2^1,\ B_2^2$,

$A_1^1,\ A_1^2,\ A_1^3,\ A_1^4,\ A_1^5,\ A_1^8,\ A_1^{10},\ A_1^{11},\ A_1^{20},\ A_1^{35}$,

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