Classifications of Real Hypersurfaces in Complex Space Forms by means of Curvature Conditions

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Abstract

It has been proved there are no semi-parallel real hypersurfaces in the complex projective space $\mathbb{C}P^n$, $n \geq 3$, and in any non-flat complex space form of complex dimension 2. Also, characterizations of geodesic hyperspheres and ruled real hypersurfaces in $\mathbb{C}P^n$, $n \geq 3$, have been obtained by considering some other curvature conditions. We generalize these results by studying two new conditions for real hypersurfaces in non-flat complex space forms. As a corollary, we extend the known characterizations to real hypersurfaces of type A_0 and A_1 and ruled real hypersurfaces in non-flat complex space forms. In particular, we prove that there are no semi-parallel real hypersurfaces in non-flat complex space forms of complex dimension at least 2.

1   Introduction

In Y. Tashiro and S. Tachibana's classical paper [11], we can find a proof for the non-existence of totally umbilical real hypersurfaces in non-flat complex space forms $\overline{M}^n(c)$, $n \geq 2$, of constant holomorphic sectional curvature $4c \neq 0$. This is closely related to the fact that there are no real hypersurfaces in $\overline{M}^n(c)$, $n \geq 2$, whose