Section number: 04

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Title: Real hypersurfaces of low Chen-type in non-flat complex space forms.

Abstract: In the theory of submanifolds of finite type one calls an isometric immersion $x : M \to E^N$ of a Riemannian manifold into Euclidean space an immersion of k-type if the position vector allows the decomposition into k eigenvectors of the Laplacian. A complex projective or hyperbolic space $\mathbf{C}Q^m$ can be isometrically embedded into the Euclidean space of Hermitian matrices $H^{(1)}(m+1)$ by the first standard embedding ϕ. Thus for any submanifold $x : M \to \mathbf{C}Q^m$ we have an associated immersion $\tilde{x} = \phi \circ x$. We study the Hopf hypersurfaces of $\mathbf{C}Q^m$ whose associated immersion $\tilde{x}$ is of low type. We prove the following result:

Let M^n be a Hopf hypersurface of $\mathbf{C}Q^m(4)$ $(n = 2m - 1)$. Then M^n is of 2-type via $\tilde{x}$ if and only if it is an open portion of one of the following: (i) A geodesic hypersphere of any radius $r \in (0, \pi/2]$ except $r = \arctan\sqrt{n+2}$. (ii) A tube of certain radius over canonically embedded $\mathbf{C}P^k$, $k = 1, ..., n - 2$. (iii) A tube of certain radius over a complex quadric $\mathbf{Q}^{m-1}$.

We also characterize minimal Hopf hypersurfaces of these spaces which are mass-symmetric and of 3-type in $H^{(1)}(m+1)$.