

A characterization of hypersurfaces of nearly Kähler $\mathbb{S}^3 \times \mathbb{S}^3$ with $\mathcal{P}$ -principal normal

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Abstract. In this article, we continue the study of hypersurfaces of homogeneous nearly Kähler $\mathbb{S}^3 \times \mathbb{S}^3$ with a $\mathcal{P}$ -principal normal vector field ξ . After proving that the smooth angle function θ , from the defining relation $P\xi = \cos \theta \xi + \sin \theta J\xi$, is constant, with the only possibilities being $\{-\frac{\pi}{3}, \frac{\pi}{3}, \pi\}$, we prove that all such hypersurfaces are Hopf, with either 3 or 5 distinct principal curvatures. The main results are: the complete classification of hypersurfaces of $\mathbb{S}^3 \times \mathbb{S}^3$ with $\mathcal{P}$ -principal normal and with 3 distinct principal curvatures, as well as the general form of the immersion of such hypersurfaces with 5 distinct principal curvatures. If these 5 curvatures are all additionally constant, we give the explicit classification. We also provide new examples of hypersurfaces of $\mathbb{S}^3 \times \mathbb{S}^3$ with $\mathcal{P}$ -principal normal, such that certain of them have constant mean curvature.

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