POSTER

Flat Contact Angle Surfaces in the Heisenberg Group H^3

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Resumo/Abstract:

Surfaces making constant angles with certain directions are interesting and they are intensively studied by several authors in different ambient spaces. Recently, Munteanu, Fastenakels and van der Veken, in [2], extended the notion of constant angle surfaces in $S^2 \times R$ and $H^2 \times R$ to general Bianchi,Cartan,Vranceanu spaces and they showed that these surfaces have constant Gaussian curvature, also they gave a complete local classification in the Heisenberg group. In [1], we constructed a family of minimal tori in S^5 with constant contact angle and constant holomorphic angle. These tori are parametrized by the following circle equation

$$a^2 + \left(b - \frac{\cos\beta}{1+\sin^2\beta}\right)^2 = 2\frac{\sin^4\beta}{(1+\sin^2\beta)^2}$$

These examples are defined for $0 < \beta < \frac{\pi}{2}$. Also, when $b = 0$, we find a new family of minimal tori in S^5, and these tori are defined for $\frac{\pi}{4} < \beta < \frac{\pi}{2}$.

In this poster, we proved that the Gaussian curvature K of a surface in H^3 with contact angle β and constant mean curvature $H \neq 0$ is given by:

$$K = -3\sin\beta - |\nabla\beta + e_1|^2 - 2H\beta_2$$

Moreover, the contact angle satisfies the following Laplacian equation

$$\Delta(\beta) = -2H_2 - \tan(\beta)(|\nabla\beta + 2e_1|^2 + 4H(H+\beta_2) + \frac{\cos^2\beta}{\sin\beta})$$

Using the equations of Gauss and Codazzi, we have proved the following theorem:

Theorem 1 *Consider S a flat orientable Riemannian surface and $\beta : S \rightarrow]0, \frac{\pi}{2}[$ a function over S that verifies the following equation:*

$$\Delta(\beta) \quad = \quad \tan(\beta)(|\nabla\beta|^2 - 4H^2 - 2 + 6\sin\beta - \frac{\cos^2\beta}{\sin\beta})$$

then there exist only one immersion of S into H^3 such that $H \neq 0$ is the constant mean curvature of S, and β is the contact angle of this immersion.

References

[1] R.R. Montes, J.A. Verderesi: *Contact Angle for Immersed Surfaces in S^{2n+1}*, Differential Geometry and its Applications, Vol. 25, (2007), 92-100.

[2] M.I. Munteanu, J. Van der Veken, J. Fastenakels : *Constant angle surfaces in the Minkowski space*, Acta Mathematica Sinica (English Series), 27 (2011) 4, 747 - 756.