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Erratum to: "Null Mannheim curves in the Minkowski 3-space $\mathbb{E}_1^3$"

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Abstract: In this paper, Theorem 3.2 and Proposition 3.2 in the paper which is cited in the title are corrected.

We give the following Theorem 3.2* instead of Theorem 3.2 on page 111 in [1]. Its proof had been done in [2].

Theorem 3.2*. A Cartan framed null curve α in $\mathbb{E}_1^3$ is a null Mannheim curve with timelike or spacelike Mannheim partner curve β if and only if torsion τ of α is a nonzero constant.

According to the above Theorem 3.2*, we have following proposition 3.2* instead of Proposition 3.2 which is given in [1] .

Proposition 3.2*. If a timelike or spacelike generalized helix is the Mannheim partner curve of some Cartan framed null curve $\alpha = \alpha(s)$, then the curvature of the Cartan framed null curve α is

$$\kappa(s) = \frac{c_2}{(s + 2c_1)^2}$$

for some nonzero constants c_1 and c_2.

Proof Let α be a null Mannheim curve and β be its timelike Mannheim partner curve. Assume that β is a timelike generalized helix; then we have

$$< B, p >= ch\theta_0 \tag{1}$$

for some constant vector p and some constant angle θ_0. If we consider Proposition 3.1 in [1], we have

$$ch\theta_0 \neq 0 \text{ and } \frac{\kappa}{\tau} \neq const. \tag{2}$$

Since u is in the binormal direction of β, also we have from (1)

$$< u, p >= ch\theta_0 = const. \neq 0. \tag{3}$$

If we derivate of (3) with respect to s twice and use $\tau = const.$, we obtain

$$\tau < l, p > +\kappa < n, p >= 0$$

$$< n, p >= -\frac{2\kappa\tau ch\theta_0}{\kappa'} \tag{4}$$

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$$< l, p >= \frac{2\kappa^2 ch\theta_0}{\kappa'}.$$

Taking the derivative second or third equation of (4), we get nonlinear differential equation

$$2\kappa\kappa'' - 3(\kappa')^2 = 0.$$

Solving this equation, we obtain

$$\kappa(s) = \frac{c_2}{(s + 2c_1)^2}$$

for some nonzero constants c_1 and c_2. Thus, the proposition is proved.

In case the spacelike generalized helix is the Mannheim partner curve of some Cartan framed null curve $\alpha = \alpha(s)$, the proof is similar. □

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References

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[2] Lee, J.W.: No null-helix Mannheim curves in the Minkowski space E_1^3, Int. J. of Math. and Mathematical Sci., Article ID 580537, 7 pages (2011).