

Smarandache Curves of Alternative Frame

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ABSTRACT

In differential geometry, special curves have an important role. One of these curves Smarandache curves. Smarandache curves was firstly defined by M. Turgut and S. Yılmaz in 2008. Let $\alpha = \alpha(s)$ be a regular unit speed curve in E^3 . This curves Frenet frame and Alternative Frame are $\{T, N, B\}$ and $\{N, C, W\}$, respectively. In there, N is normal vector, W is unit Darboux vector and $C = W \times N$.

In this paper, we created the Smarandache curves according to the alternative frame of the unit speed curve. Firstly, we introduced unit Darboux vector, Smarandache Curves, Frenet frame, Frenet apparatus, Alternative frame and its properties. After that we mentioned the relationship with Alternative frame and Frenet frame. Then we defined four curves. And we calculated curvature, torsion, Frenet frame and Alternative frame of these curves. First curve is $\alpha_{NC} = \frac{1}{\sqrt{2}}(N + C)$. It can be called by α_{NC} -Smarandache curve. This curves curvature, torsion, Frenet frame and Alternative frame are $\kappa_{NC}, \tau_{NC}, \{T_{NC}, N_{NC}, B_{NC}\}$ and $\{N_{NC}, C_{NC}, W_{NC}\}$, respectively. α_{NW} -Smarandache curve is $\alpha_{NW} = \frac{1}{\sqrt{2}}(N + W)$. This curves curvature, torsion, Frenet frame and Alternative frame are $\kappa_{NW}, \tau_{NW}, \{N_{NW}, C_{NW}, W_{NW}\}$ and $\{N_{NW}, C_{NW}, W_{NW}\}$, respectively. α_{CW} -Smarandache curve is $\alpha_{CW} = \frac{1}{\sqrt{2}}(C + W)$. This curves curvature, torsion, Frenet frame and Alternative frame are $\kappa_{CW}, \tau_{CW}, \{T_{CW}, N_{CW}, B_{CW}\}$ and $\{N_{CW}, C_{CW}, W_{CW}\}$, respectively. α_{NCW} -Smarandache curve is $\alpha_{NCW} = \frac{1}{\sqrt{3}}(N + C + W)$. This curves curvature, torsion, Frenet frame and Alternative frame are $\kappa_{NCW}, \tau_{NCW}, \{T_{NCW}, N_{NCW}, B_{NCW}\}$ and $\{N_{NCW}, C_{NCW}, W_{NCW}\}$, respectively.

Finally, we visualized the defined curves and their Frenet and Alternative frame apparatuses with the aid of the maple program.

Key Words: Unit darboux vector, alternative frame, frenet frame, smarandache curves.

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