

Singularities of 3-parameter line congruences in \mathbb{R}^4

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Abstract: In this talk we define 3-parameter line congruences in \mathbb{R}^4 , which is nothing but a 3-parameter family of lines over a hypersurface in \mathbb{R}^4 . Locally, we write $\mathcal{C} = \{x(u), \xi(u)\}$, where $x : U \rightarrow \mathbb{R}^4$ (reference hypersurface) and $\xi : U \rightarrow \mathbb{R}^4 \setminus \{0\}$ (director hypersurface) are smooth, where $U \subset \mathbb{R}^3$ is open. We also investigate the singularities associated to a special class of congruences, called Blaschke affine normal congruences, which occurs when the reference hypersurface x is non-degenerate and the director hypersurface ξ is given by its Blaschke normal vector field. Our goal is to show that the generic singularities of

$$F_{(x,\xi)} : U \times I \rightarrow \mathbb{R}^4 \quad (0.1)$$
$$(u, t) \mapsto x(u) + t\xi(u),$$

where I is an open interval, are the Lagrangian stable singularities, providing a positive answer to the conjecture presented in [1].

Joint work with: Débora Lopes (UFS) and Maria Aparecida Soares Ruas (ICMC).

References

- [1] Izumiya, S., Saji, K., Takeuchi, N. Singularities of line congruences . Proc. of the Royal Society of Edinb., 133A, 1341-1359, 2003.
- [2] Lopes, D., Ruas, M. A. S., Santos, I. C. . Singularities of 3-parameter line congruences in \mathbb{R}^4 . arXiv:2110.10818v2.