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Title:

On the Differential Equations of Principal Curvature Lines and their Singularities.

Abstract:

After a short discussion of some historical landmarks for the study of the differential equations as in the title, going back to Euler, Monge and Darboux, for the case of surfaces in Euclidean 3-space, the results of Gutierrez and Sotomayor (1982-3) on surfaces with Structurally Stable principal curvature lines and umbilic singularities will be reviewed and their connections with Peixoto's Theorem (1962) for Structurally Stable Differential Equations (Vector Fields) on compact surfaces will be analyzed.

The problems to achieve an extension of the results for surfaces to hypersurfaces in Euclidean 4-space, will be mentioned and an outline of an improved version of the Genericity Theorem (of Kupka – Smale type) due to R. Garcia (1992) for this case, with emphasis on the stratified structure of their partially umbilic singularities and separatrix surfaces, will be given.

The mathematical ingredients of this lecture can be regarded as belonging to the elusive boundary between Geometry, Analysis and Dynamical Systems.

Work in collaboration with R. Garcia (UFG) and D. Lopes (UFS).