

1154-53-91

Nabil Kahouadji*, Mathematics Department, Northeastern Illinois University, Chicago, IL 60625. *Isometric Immersions of Pseudo-Spherical Surfaces via PDEs.*

Pseudo-spherical surfaces (PSS) are surfaces of constant negative Gaussian curvature. A way of realizing such a surface in 3d space is obtained by rotating the graph of a curve called tractrix around the z-axis. There is a remarkable connection between the solutions of the sine-Gordon eq and PSS, in the sense that every generic solution of this eq can be shown to give rise to a PSS. Furthermore, the sine-Gordon eq has the property that the way in which the PSS corresponding to its solutions are realized geometrically in 3d space is given in closed form through some remarkable explicit formulas. The sine-Gordon eq is but one member of a very large class of differential eqs whose solutions likewise define PSS. These were defined and classified by Chern, Tenenblat and others, and include almost all the known examples of integrable PDEs. This raises the question of whether the other eqs enjoy the same remarkable property as the sine-Gordon eq when it comes to the realization of the corresponding surfaces in 3d space. We will see that the answer is no, and will provide a full classification of hyperbolic and evolution eqs. The classification results will show, among other things, that the sine-Gordon eq is quite unique in this regard amongst all integrable eqs. (Received August 01, 2019)