

Title : Rigidity results around Hilbert's fourth problem.

Abstract: Hilbert's fourth problem asks to construct all metrics (symmetric and asymmetric) on convex domains for which geodesics are straight lines. When the metric is symmetric (i.e., the distance from a point x to a point y equals the distance from y to x) this problem was solved through the successive efforts of Busemann and Pogorelov, but the general case when the metric is asymmetric remains open. Nevertheless, there has been some recent progress by G. Berck, J. Barbosa, and myself when there are conditions at "infinity" or groups of symmetries. In those cases the asymmetric metric is necessarily the sum of a symmetric metric and a trivial coboundary (in the Finsler case, the sum of a reversible Finsler metric and a closed 1-form). This talk I show why this is the case when the metric in \mathbf{R}^n is periodic or radially symmetric.