

Geodesically Equivalent Metrics

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Two metrics are said to be geodesically equivalent if they define the same geodesic paths, even with different parameterizations. The first example of this dates all the way back to Lagrange, and the topic was later studied by figures such as Beltrami, Liouville or Levi-Civita. Interest increased with the formulation of General Relativity, which motivated wide research on the problem during the 20th century, which bore several results the recent years, specially in the relativistic framework.

In this talk we will expose a procedure for obtaining all possible pseudo-Riemannian metrics for which a given set of curves are geodesics, regardless of their parameterization. This involves the reconstruction of a class of symmetric affine connections among which we search for metric connections. To do that, two main system of equations will be considered, and we will look into the extent and generality with which they solve the posed problem. We will also demonstrate this procedure with two bidimensional examples.