λ-Projectively Related Finsler Metrics and Finslerian Projective Invariants

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Extended Abstract
Paper pages (621-630)

Introduction

In this paper, by using the concept of spherically symmetric Finsler metric, we define the notion of λ-projectively related metrics as an extension of projectively related metrics. We construct some non-trivial examples of λ-projectively related metrics. Let F and $\bar{F}$ be two λ-projectively related metrics on a manifold M. We find the relation between the geodesics of F and $\bar{F}$ and prove that any geodesic of F is a multiple of a geodesic of $\bar{F}$ and the other way around. There are several projective invariants of Finsler metrics, namely, Douglas metrics, Weyl metrics and generalized Douglas-Weyl curvature. We prove that the Douglas metrics, Weyl metrics and generalized Douglas-Weyl metrics are λ-projective invariants.

Material and methods

First we obtain the spray coefficients of a spherically symmetric Finsler metric. By considering it, we define λ-projectively related metrics which is a generalization of projectively related Finsler metrics. Then we find the geodesics of two λ-projectively related metrics. We obtain the relation between Douglas, Weyl and generalized Douglas-Weyl curvatures of two λ-projectively related metrics.

Results and discussion

We find the Douglas curvature, Weyl curvature and generalized Douglas-Weyl curvature of two λ-projectively related Finsler metrics. These calculations tell us that these class of Finsler metrics are λ-projective invariants.

Conclusion

The following conclusions were drawn from this research.

- We prove that the Douglas curvature, Weyl curvature and generalized Douglas-Weyl curvature are λ-projective invariants.
- Let F and $\bar{F}$ be two λ-projectively related metrics on a manifold M. We show that F is a Berwald metric if and only if $\bar{F}$ is a Berwald metric.

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