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Paths in a Finsler space

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The purpose of this paper is to introduce paths in a Finsler space from a standpoint of a connection in a principal bundle. In a Riemannian space, a geodesic is, of course, defined as an extremal of the length integral, and it is well known that a geodesic coincides with a path defined with respect to the Riemannian connection given by the Christoffel's symbols. On the other hand, a geodesic in a Finsler space is defined in like manner, but the explicit equation of a geodesic is obtained in various forms by several authors, according to the choice of a connection [1], [6].

In a previous paper [2] was presented the theory of a Finsler connection in a certain principal bundle Q. According to this definition of a Finsler connection, various paths may be obtained in a Finsler space. In the case of an ordinary connection it is known that the projection of any integral curve of every basic vector field in a bundle space is a path in the base manifold, and conversely, every path in the manifold is obtaind in this way [4, p. 63]. In the present paper, this theorem is taken as the standpoint of the definition of paths in a Finsler space.

The terminologies and signs of papers [2] and [3] will be used in the following without too much comment.

§1. Basic vector fields

We denote by $P(M, \pi, G)$ the bundle of frames of a differentiable n-manifold M, and by $B(M, \tau, F, G)$ the tangent vector bundle of M, where G is the full linear real group $GL(n, R)$ and F is the real