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V-Transformations of Finsler spaces I.

Definition, infinitesimal transformations and isometries

Dedicated to Professor T. Nakae on his 60th birthday

By

Makoto MATSUMOTO

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The theory of transformations of Finsler spaces has been studied by several authors and many results have been obtained. (See, for example, [6],[1] p. 199; [23], p. 172; [27], p. 181.) Almost all of the authors are concerned with the so-called *extended point transformation* composed of a point transformation $\bar{x}^i = x^i + X^i(x)dt$ of the manifold M and $\bar{y}^i = y^i + \partial_j X^i(x) y^j dt$, where $X^i(x)$ are components of a tangent vector field X on M and $y^i = \dot{x}^i$. When the extended point transformation is treated in the tangent bundle $T(M)$, we have the tangent vector field

$$\bar{X} = X^i(x)\partial/\partial x^i + (\partial_j X^i(x)) y^j \partial/\partial y^i$$

on $T(M)$, which is called the complete lift of X [28] or the derived vector field from X [16], p. 187.

There are, however, some authors who are concerned with the generalizations of the extended point transformation. For instance, the present author introduces the notion of *linear transformation* of the tangent bundle [11, 12, 14, 16,]. It is shown that the tangent vector field on the tangent bundle appearing in the case of the linear transformation is written as the sum of tangent vector fields $\bar{X}$ and

1) Numbers in brackets refer to the references at the end of the paper.