

NON-HOLONOMIC SYSTEM IN A SPACE OF HIGHER ORDER I. ON THE OPERATIONS OF EXTENSORS

By

Yoshie KATSURADA

Introduction. In the previous papers [1]⁽¹⁾ the present author has treated the theory of certain non-holonomic spaces of line-elements and of the non-holonomic system depending on line-elements. The principal purposes of the present paper are to generalize the concept "non-holonomic system" into a space of higher order and to find in the generalized non-holonomic system the structure of several operations of extensors considered by Prof. A. KAWAGUCHI [2]. The former is stated in § 2 and the latter in §§ 4–9. As the preparation for these purposes, § 1 is devoted to the exposition of the notations employed and of the definition of extensors introduced first by H. V. CRAIG [3] and in § 3 we treat upon the transformations of the non-holonomic systems. Since there are three kinds of the previous operations, any two of these produce their products. In the last chapter, we discuss therefore the commutativity of these products.

The present author wishes to express to Prof. A. KAWAGUCHI her very sincere appreciation for his helpful guidance and his careful criticisms.

§ 1. **Notations and preliminaries.** In the present paper we shall employ at most two holonomic coordinate systems x and \bar{x} and so far as the quantities that bear indices are concerned, we shall distinguish them whenever feasible by restricting the choice of indicial letters. Specifically, letters at the first of the alphabet a, b, c, d, e shall serve to denote the system \bar{x} , while i, j, k, l, m , will be correlated to the system x . Thus x^i is the i -th coordinate variable of the system x , while \bar{x}^a is a variable of number a of the system \bar{x} . Differentiation with respect

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