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CONNECTIONS ASSOCIATED WITH LINEAR DISTRIBUTIONS

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Abstract. This paper applies differential geometry to multi-dimensional affine space. The three-component distributions of affine space are discussed. Some connections of three-component distributions, which allow to generalize theory of regular and vanishing hyper-zones, zones, hyper-zone distributions, surfaces of full and non-full rank, and tangent equipped surfaces in multidimensional affine spaces are constructed.

1. Introduction

It is proved here that the first kind normal field for the basic distribution determines affine connection on the V-distributions. Another affine connection is defined by an inner invariant way in the second differential neighborhood of forming element of the three-component distribution. In special case studied connections are analog connections for the huperzone distributions of the m-dimensional linear elements. The components of the torsion and curvature tensor of the affine connections are obtained. The results of research can be applied to general theory of distributions in multidimensional spaces and to the theory of connections, which are associated with the multi-component distributions.

The method of my research is based on the differential-geometrical method developed by Laptev [4, 5].

2. Definition of the Three-Component Distribution

Let us consider $(n+1)$-dimensional affine space A_{n+1}, which is taken to a moving frame $R = \{A, \vec{e}_I\}$. Differential equations of the infinitesimal transference of frame R look as follows

$$\mathrm{d}A = \omega^I \vec{e}_I, \qquad \mathrm{d}\vec{e}_I = \omega_I^K \vec{e}_K$$

where ω_I^K, ω^I are invariant forms of an affine group, which satisfy the equations of the structure

$$\mathrm{d}\omega^I = \omega^K \wedge \omega_K^I, \qquad \mathrm{d}\omega_I^K = \omega_I^J \wedge \omega_J^K.$$