

*The Holonomy Group VI. Weyl Space W_4 , Second Part**

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Synopsis. This is the sixth in the series of papers dealing with the holonomy group. It is the second part of the investigations started in [5], and therefore it is a direct continuation of [5]. While [5] consists of the first three chapters, the present paper contains the concluding two chapters, namely Chapter IV (Sections 15–17) and Chapter V (Sections 18–24). Chapter IV is devoted to the investigation of the finite transformations of the holonomy groups. It turns out that there is a standard procedure which permits an easy construction of finite transformations defined by infinitesimal operators of the group under consideration.

Chapter V deals with the group invariants. Two methods are used. The first one deals with invariant complexes and the second investigates invariant vector fields. In the last section of this chapter previous results are applied to the investigation of absolute fields.**

In [5] we proved the existence of a Lie group symbolized by $G_1(R, \theta)$. However, we did not prove that the group denoted by this symbol is necessarily the holonomy group. Therefore in Sections 15–22 we shall understand by $G_1(R, \theta)$ the group defined in [5] which is *not necessarily the holonomy group*.

IV

15. Auxiliary results. In this part of the paper we shall use previous results to derive the finite form of the transformations of the group $G_1(R, \theta)$ as well as its invariants. In the fourth chapter we shall be interested only in the finite form of the transformations of $G_1(R, \theta)$. To this effect we need some auxiliary results which we derive in this section.

Lemma (15.1). *Every infinitesimal operator of $G_1(R, \theta)$ exhibited in the third chapter has the form*

$$(15.1a) \quad X = 2C_1[\eta^x \partial_x] + 2C_2[\eta^z \partial_z] + C_3 \eta^a \partial_a \dagger$$

where C_1, C_2, C_3 (not all equal to zero) are scalars not containing η^i .

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** We remind the reader that degenerate groups are excluded from our investigations (cf. Agreement (5.1)).

† Here and in subsequent considerations the indices x, y, z, t are always of mutually different values 1, \dots , 4 and do not follow the Einstein summation rule.