

# *Basic Principles of the Unified Field Theory of the Second Kind, II\* \*\**

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## CHAPTER III. PRELIMINARY INFORMATION ABOUT $\Gamma_{\lambda}{}^{\nu}{}_{\mu}$

**14. Formal Solution of (A).** In this chapter we shall find necessary conditions for the solution of the system (A), *i.e.*

$$(14.1a) \quad \partial_{\omega} g_{\lambda\mu} - \Gamma_{\lambda}{}^{\alpha}{}_{\omega} g_{\alpha\mu} - \Gamma_{\omega}{}^{\alpha}{}_{\mu} g_{\lambda\alpha} = 0.$$

The connection  $\Gamma_{\lambda}{}^{\nu}{}_{\omega}$  gives rise to the *torsion tensor*

$$(14.2a) \quad S_{\lambda\mu}{}^{\nu} \stackrel{\text{def}}{=} \Gamma_{[\lambda}{}^{\nu}{}_{\mu]}$$

and to the *torsion vector*

$$(14.2b) \quad S_{\lambda} \stackrel{\text{def}}{=} S_{\lambda\alpha}{}^{\alpha}.$$

According to EINSTEIN the connection  $\Gamma_{\lambda}{}^{\nu}{}_{\mu}$  has to satisfy the condition

$$(14.1b) \quad S_{\lambda} = 0.$$

In this chapter we shall be concerned chiefly with the system (14.1a) and we shall denote by  $D_{\omega}$  the symbol for the covariant derivative with respect to  $\Gamma_{\lambda}{}^{\nu}{}_{\omega}$ .

**Theorem (14.1).** *The system (14.1a) is equivalent to*

$$(14.3) \quad D_{\omega} g_{\lambda\mu} = 2S_{\omega\mu}{}^{\alpha} g_{\lambda\alpha}.$$

*This system may be split into two, namely*

$$(14.4a) \quad D_{\omega} h_{\lambda\mu} = 2S_{\omega(\mu}{}^{\alpha} g_{\lambda)\alpha},$$

$$(14.4b) \quad D_{\omega} k_{\lambda\mu} = 2S_{\omega[\mu}{}^{\alpha} g_{\lambda]\alpha}.$$

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\*\*This paper is a straightforward continuation of a paper published under the same title in the same journal (Journal of Mathematics and Mechanics). Therefore the numbering of sections starts with Section 14. The symbolism as well as the results of the first paper are also used in this second paper.