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REGULARLY METRIZABLE CONNECTIONS AND TENSORS OF TYPE (1,3)

(Preliminary communication)

Oldřich KOWALSKI, Praha

In a paper under the same title we deal with two problems:

a) Let  $\nabla$  be a linear connection without torsion on a manifold  $M$ . Under what conditions  $\nabla$  is locally the Levi-Civita connection of a Riemann metric on  $M$  ?

b) Let  $B$  be a tensor of type (1,3) on  $M$ . Under which conditions  $B$  is locally a Riemann curvature tensor?

A Riemann metric  $g$  on  $M$  is called regular at a point  $\mu$  if the sectional curvature  $\sigma(P)$  is non-zero in any 2-dimensional direction  $P$  at  $\mu$ .

An explicit solution of both local problems is given for the regular case. We state necessary and sufficient conditions for a linear connection  $\nabla$  (or for a tensor  $B$  of type (1,3)) to be locally induced by a regular Riemann metric  $g$ . Moreover, if the above conditions are fulfilled, the corresponding Riemann metric  $g$  can be determined, exact up to a positive constant factor, only by algebraic calculations and by the integration of an exact

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differential. (An exceptional case for the second problem arises if  $\dim M = 2$  .)

Also a global theorem is proved, which is related to some results by K. Nomizu and K. Yano [1], and by R. S. Kulkarni [2].

Theorem. Let  $(M, g)$  be a regular Riemann space of dimension  $m \geq 3$  . Then any curvature tensor-preserving diffeomorphism of  $(M, g)$  onto a Riemann space  $(M', g')$  is a homothety.

(  $M, M'$  are supposed to be of class  $C^4$  and  $g, g'$  of class  $C^3$  .)

#### R e f e r e n c e s

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- [2] KULKARNI R.S.: Curvature and metric, Ann.of Math.91 (1970), 311-331.

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