On Some Solutions of $\frac{\sqrt{\Delta}}{2}\epsilon_{stpq}K_{lm}^{\cdot\cdot pq} = K_{lmst}$.

By

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The object of this paper is to find out from the physical standpoint some useful solutions of the fundamental equation for g_{ij}:

$$\frac{\sqrt{\Delta}}{2}\epsilon_{stpq}K_{lm}^{\cdot\cdot pq} = K_{lmst}. \qquad (0.1)$$

The general solutions of this equation have been obtained by T. Sibata and one of the present authors,(1) but these are not yet directly applicable to the physical problem, so we shall investigate this problem from another point of view. First, we shall find out some approximate solutions, and then proceed to the finite solutions.

§ 1. Approximate solutions.

If we exclude the euclidean terms, the most general approximate solution of the equation (0.1) is given by solving the following equation(2):

$$\left.\begin{aligned} &g_{ij} = \delta_{ij} + h_{ij}, \qquad |h_{ij}|^2 \ll 1. \\ &-\frac{\partial h_{1m}}{\partial x^2} + \frac{\partial h_{2m}}{\partial x^1} + \frac{\partial h_{3m}}{\partial x^4} - \frac{\partial h_{4m}}{\partial x^3} = 0 \\ &\frac{\partial h_{1m}}{\partial x^3} + \frac{\partial h_{2m}}{\partial x^4} - \frac{\partial h_{3m}}{\partial x^1} - \frac{\partial h_{4m}}{\partial x^2} = 0 \\ &\frac{\partial h_{1m}}{\partial x^4} - \frac{\partial h_{2m}}{\partial x^3} + \frac{\partial h_{3m}}{\partial x^2} - \frac{\partial h_{4m}}{\partial x^1} = 0 \end{aligned}\right\} \; (i, j, \ldots, l, m, \ldots = 1, 2, 3, 4) \qquad (1.1)$$

(1) T. Sibata and K. Morinaga, This Journal, **6** (1935), 173.

(2) T. Sibata, This Journal, **5** (1935), 195. The corresponding equation for $g_{ij} = \bar{\delta}_{ij} + k_{ij}$ can be obtained by the transformation $x^i = \bar{x}^i$ $(i = 1, 2, 3)$, $x^4 = i\bar{x}^4$ where $\bar{\delta}_{ij} = 0$ for $i \neq j$ and $\bar{\delta}_{11} = \bar{\delta}_{22} = \bar{\delta}_{33} = -\bar{\delta}_{44} = 1$.