(0としてよい)

$$\bar{R}_{abcd} = R_{abcd} - \sum_{\alpha=1}^{3} p_\alpha^2 A_{\alpha,bc} A_{\alpha,ad} + \sum_{\alpha=1}^{3} p_\alpha^2 A_{\alpha,ac} A_{\alpha,bd} + 2\sum_{\alpha=1}^{3} p_\alpha^2 A_{\alpha,ab} A_{\alpha,cd}$$

$$\bar{R}_{abc\alpha} = -p_\alpha \nabla_a A_{\alpha,bc} + p_\alpha \nabla_b A_{\alpha,ac} \qquad (☆)$$

$$\bar{R}_{ab\alpha\beta} = -p_\alpha p_\beta g_{cd} A_{\beta,a}{}^{c} A_{\alpha,b}{}^{d} + p_\alpha p_\beta A_{\beta,b}{}^{c} A_{\alpha,a}{}^{d}$$

$$\bar{R}_{a\alpha b\beta} = -p_\alpha p_\beta g_{cd} A_{\beta,a}{}^{c} A_{\alpha,b}{}^{d} + p_\beta g_{cb} A_{\beta,a}{}^{c} \underline{s_{\alpha\beta}} \qquad (☆)$$

これもパラメータ(係数)

$$\bar{R}_{a\alpha\beta\gamma} = 0 = \bar{R}_{\alpha a\beta\gamma} = \bar{R}_{\alpha\beta a\gamma} = 0, \qquad \bar{R}_{\alpha\beta\gamma\delta} = 0$$

$$\bar{R}_{ijk\alpha} = -R_{jik\alpha}, \qquad \bar{R}_{ijk\alpha} = -\bar{R}_{ij\alpha k}$$

$$\bar{R}_{ijk\alpha} + \bar{R}_{jki\alpha} + \bar{R}_{kij\alpha} = 0$$

$$\bar{R}_{ijk\alpha} = \bar{R}_{k\alpha ij}$$

$$\nabla_a A_{1,b}{}^c = r_1 A_{2,b}{}^c - r_2 A_{3,b}{}^c$$

$$\nabla_a A_{2,b}{}^c = -r_1 A_{1,b}{}^c + r_3 A_{3,b}{}^c$$

$$\nabla_a A_{3,b}{}^c = r_2 A_{1,b}{}^c - r_3 A_{2,b}{}^c$$

$r_\alpha$
$=$
$(r_1, r_2, r_3$ をパラメータ係数$)$

$$A_1 = \left(\begin{array}{cc|cc} 0 & 1 & & \\ -1 & 0 & \multicolumn{2}{c}{0} \\ \hline & & 0 & -1 \\ \multicolumn{2}{c|}{0} & 1 & 0 \end{array}\right)$$

$$A_2 = \left(\begin{array}{cc|cc} & & 1 & 0 \\ \multicolumn{2}{c|}{0} & 0 & 1 \\ \hline -1 & 0 & & \\ 0 & -1 & \multicolumn{2}{c}{0} \end{array}\right)$$

$$A_3 = \left(\begin{array}{cc|cc} & & 0 & 1 \\ \multicolumn{2}{c|}{0} & -1 & 0 \\ \hline 0 & 1 & & \\ -1 & 0 & \multicolumn{2}{c}{0} \end{array}\right)$$

江本さんの教えてくれた四元数の行列表現