$$\mathbb{R}^n \xrightarrow{\ \underline{\mathcal{U}} = \underline{\mathcal{U}}^1 \cdots \underline{\mathcal{U}}^N\ } \mathbb{R}^N$$

$${}_{\mu\nu}\underbrace{\underline{\mathcal{U}} \bowtie \mathcal{H}} = {}_{\mu}\underline{\mathcal{U}}^{\,i}\; {}_{\nu}\underline{\mathcal{U}}^{\,j}\; \mathcal{H}_{ij}$$

$$\mathcal{H} = \underbrace{\underline{\mathcal{U}} \bowtie \mathcal{H}} = \underline{\mathcal{U}}\;\underline{\mathcal{U}}\;\mathcal{H}$$

$$\underline{\mathcal{U}} =
\begin{array}{c|c|c}
{}_{1}\underline{\mathcal{U}}^{1} & \cdots & {}_{1}\underline{\mathcal{U}}^{N} \\ \hline
\vdots & \ddots & \vdots \\ \hline
{}_{n}\underline{\mathcal{U}}^{1} & \cdots & {}_{n}\underline{\mathcal{U}}^{N}
\end{array}$$

$$\mathcal{H} =
\begin{array}{c|c|c}
\mathcal{H}_{11} & \cdots & \mathcal{H}_{1N} \\ \hline
\vdots & \ddots & \vdots \\ \hline
\mathcal{H}_{N1} & \cdots & \mathcal{H}_{NN}
\end{array}$$

$$\mathcal{H} =
\begin{array}{c|c|c}
\mathcal{H}_{11} & \cdots & \mathcal{H}_{1n} \\ \hline
\vdots & \ddots & \vdots \\ \hline
\mathcal{H}_{n1} & \cdots & \mathcal{H}_{nn}
\end{array}$$

$$0/ \qquad \mathcal{H} = \underline{\mathcal{U}}\,\mathcal{H}\,\underline{\mathcal{U}}^{\,t}$$

$$(\chi, \vartheta, \varphi) \in \mathbb{R}^3 \xrightarrow[\text{pol coord}]{\curvearrowright} \mathbb{R}_4 \ni a\left(\cos\chi, \sin\chi\cos\vartheta, \sin\chi\sin\vartheta\cos\varphi, \sin\chi\sin\vartheta\sin\varphi\right)$$

$$^{\chi,\vartheta,\varphi}\underline{\curvearrowright} = a\left(\cos\chi, \sin\chi\cos\vartheta, \sin\chi\sin\vartheta\cos\varphi, \sin\chi\sin\vartheta\sin\varphi\right)$$

$$\underline{\curvearrowright} =$$

1/ $\quad \underline{\curvearrowright} \bowtie \left(dw^2 + dx^2 + dy^2 + dz^2\right) = a^2 \overbrace{d\chi^2 + \sin^2\chi\,\underline{d\vartheta^2 + d\varphi^2\sin^2\vartheta}}$

2/ $\quad$ field equ $a^2 \overbrace{d\chi^2 + \sin^2\chi\,\underline{d\vartheta^2 + d\varphi^2\sin^2\vartheta}}$