$$\vartheta_2 = \begin{array}{c|c} \vartheta \boxtimes 1_R + \varkappa \lambda \boxtimes e^* e & \varkappa \Gamma \eta \boxtimes e^* \\ \hline \xi \Gamma \boxtimes e & \Theta \boxtimes 1_L + \varkappa \Lambda \boxtimes e e^* \end{array}$$

$$\vartheta \in {}^{\hbar}\triangle_{\infty} \underbrace{{}^{\bar{\hbar}}\triangle \overset{2}{\mathbb{K}}}: \quad \Theta \in {}^{\hbar}\triangle_{\infty} \underbrace{{}^{\bar{\hbar}}\triangle {}^2\mathbb{K}_2^{\,2}}: \quad \lambda \in {}^{\hbar}\triangle_{\infty} \mathbb{K}: \quad \Lambda \in {}^{\hbar}\triangle_{\infty} {}^2\mathbb{K}_2$$

$$\xi \in {}^{\hbar}\triangle_{\infty} \underbrace{{}^{\bar{\hbar}}\triangle {}^2\mathbb{K}}: \quad \eta \in {}^{\hbar}\triangle_{\infty} \underbrace{{}^{\bar{\hbar}}\triangle \mathbb{K}_2}$$

$$\begin{array}{c|c} \omega^0 \boxtimes 1_R & \varkappa \Gamma \psi^0 \boxtimes e^* \\ \hline \varphi^0 \Gamma \boxtimes e & \Omega^0 \boxtimes 1_L \end{array} \begin{array}{c|c} \omega^1 \boxtimes 1_R & \varkappa \Gamma \psi^1 \boxtimes e^* \\ \hline \varphi^1 \Gamma \boxtimes e & \Omega^1 \boxtimes 1_L \end{array} = \begin{array}{c|c} \begin{array}{c} \omega^0 \times \omega^1 \boxtimes 1_R + \\ \varkappa \psi^0 \varphi^1 \boxtimes e^* e \end{array} & \varkappa \Gamma \left(\psi^0 \Omega^1 - \omega^0 \psi^1 \right) \boxtimes e^* \\ \hline \left(\Omega^0 \varphi^1 - \varphi^0 \omega^1 \right) \Gamma \boxtimes e & \begin{array}{c} \left(\Omega^0 \times \Omega^1 \right) \boxtimes 1_L + \\ \varkappa \varphi^0 \psi^1 \boxtimes e e^* \end{array} \end{array}$$

$$\vartheta = \omega^0 \times \omega^1: \quad \Theta = \Omega^0 \times \Omega^1: \quad \lambda = \psi^0\, \varphi^1: \quad \Lambda: \quad \xi = \Omega^0\, \varphi^1 - \varphi^0\, \omega^1: \quad \eta = \psi^0\, \Omega^1 - \omega^0\, \psi^1$$

$$\underbrace{y_R} = \underbrace{y_L} = s: \quad \underbrace{e^* e y_R} = \underbrace{e e^* y_L} = r$$

$$\underbrace{(e^* e)^2 y_R} = \underbrace{(e e^*)^2 y_L} = t: \quad \underbrace{e \left(e^* y_L \right)} = \underbrace{e \left(y_R e^* \right)} = \underbrace{e^* e y_R}: \quad \underbrace{y_L} = \underbrace{e y_R e^{-1}} = \underbrace{y_R}$$

$$\underbrace{e e^* e \left(e^* y_L \right)} = \underbrace{e e^* \left(e y_R \right) e^*} = \underbrace{e \left(e^* y_L \right) e e^*} = \underbrace{e y_R e^* e e^*} = \underbrace{e^* e e^* e y_R}$$

$$\vartheta_2 \divideontimes \vartheta_2' = \underbrace{\vartheta_2^* \vartheta_2' I_2} = s \left(\vartheta \divideontimes \vartheta' + \Theta \divideontimes \Theta' \right) +$$

$$t \left(\lambda \divideontimes \lambda' + \Lambda \divideontimes \Lambda' \right) + r \varkappa \left(\lambda \divideontimes \vartheta' + \vartheta \divideontimes \lambda' + \Lambda \divideontimes \Theta' + \Theta \divideontimes \Lambda' - \xi \divideontimes \xi' - \eta \divideontimes \eta' \right)$$

$$\left(\begin{array}{c|c} \vartheta \boxtimes 1_R + \varkappa \lambda \boxtimes e^* e & \varkappa \Gamma \eta \boxtimes e^* \\ \hline \xi \Gamma \boxtimes e & \Theta \boxtimes 1_L + \varkappa \Lambda \boxtimes e e^* \end{array} \right)^* \begin{array}{c|c} \vartheta' \boxtimes 1_R + \varkappa \lambda' \boxtimes e^* e & \varkappa \Gamma \eta' \boxtimes e^* \\ \hline \xi' \Gamma \boxtimes e & \Theta' \boxtimes 1_L + \varkappa \Lambda' \boxtimes e e^* \end{array} \begin{array}{c|c} I \boxtimes y_R & 0 \\ \hline 0 & I \boxtimes y_L \end{array} =$$

$$\begin{array}{c|c} \bar{\vartheta} \boxtimes 1_R + \varkappa \bar{\lambda} \boxtimes e^* e & \Gamma^* \xi^* \boxtimes e^* \\ \hline \varkappa \eta^* \Gamma^* \boxtimes e & \Theta^* \boxtimes 1_L + \varkappa \Lambda^* \boxtimes e e^* \end{array} \begin{array}{c|c} \vartheta' \boxtimes y_R + \varkappa \lambda' \boxtimes e^* e y_R & \varkappa \Gamma \eta' \boxtimes e^* y_L \\ \hline \xi' \Gamma \boxtimes e y_R & \Theta' \boxtimes y_L + \varkappa \Lambda' \boxtimes e e^* y_L \end{array} =$$

$$\begin{array}{c|c} \begin{array}{c} \bar{\vartheta} \times \vartheta' \boxtimes y_R + \\ \varkappa \left(\bar{\lambda} \vartheta' + \bar{\vartheta} \lambda' - \xi^* \xi' \right) \boxtimes e^* e y_R \\ + \bar{\lambda} \lambda' \boxtimes (e^* e)^2 y_R \end{array} & * \\ \hline * & \begin{array}{c} \Theta^* \times \Theta' \boxtimes y_L + \\ \varkappa \left(\Theta^* \Lambda' + \Lambda^* \Theta' - \eta^* \eta' \right) \boxtimes e e^* y_L \\ + \Lambda^* \Lambda' \boxtimes (e e^*)^2 y_L \end{array} \end{array}$$

$$\varkappa \eta^*\, \Gamma^*\, \varkappa \Gamma\, \eta' = -\varkappa \eta^*\, \Gamma \Gamma\, \eta' = -\varkappa \eta^*\, \eta' = -\varkappa \eta^* \times \eta'$$

$$\Gamma^{*}\,\xi^{*}\,\xi'\,\Gamma=-\varkappa\Gamma\,\xi^{*}\,\xi'\,\Gamma=-\varkappa\,\xi^{*}\,\Gamma\Gamma\,\xi'=-\varkappa\,\xi^{*}\,\xi'=-\varkappa\,\xi^{*}\times\xi'$$

$$\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;{}^{2}\Big(\,\mathrm{dKer}\;\pi_{1}\Big)_{2}\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;\ni\;\begin{array}{c|c}f\boxtimes 1_{R}&0\\\hline 0&F\boxtimes 1_{L}\end{array}$$

$$\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;{}^{2}\Big(\,\mathrm{dK\overset{\perp}{e}r}\;\pi_{1}\Big)_{2}\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;\ni\;\begin{array}{c|c}\begin{matrix}\sigma\boxtimes 1_{R}+\\ \varkappa\lambda\boxtimes(e^{*}e-r/s)\end{matrix}&\varkappa\Gamma\eta\boxtimes e^{*}\\\hline \xi\Gamma\boxtimes e&\begin{matrix}\Sigma\boxtimes 1_{L}+\\ \varkappa\Lambda\boxtimes(ee^{*}-r/s)\end{matrix}\end{array}$$

$$\sigma\in\;{}^{\hbar}\triangle_{\infty}\underbrace{{}^{\hbar}_{-}\triangle^{2}\mathbb{K}}:\quad\Sigma\in\;{}^{\hbar}\triangle_{\infty}\underbrace{{}^{\hbar}_{-}\triangle\,{}^{2}\mathbb{K}_{2}}$$

$$\vartheta_{2}\in\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;{}^{2}\Big(\,\mathrm{dK\overset{\perp}{e}r}\;\pi_{1}\Big)_{2}\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;\vartheta_{2}'\in\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;{}^{2}\Big(\,\mathrm{dKer}\;\pi_{1}\Big)_{2}\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;\Longrightarrow$$

$$\vartheta'=f:\quad\lambda'=0:\quad\eta'=0:\quad\xi'=0:\quad\Theta'=F:\quad\Lambda'=0\Longrightarrow$$

$$0=\vartheta_{2}\divideontimes\vartheta_{2}'=s\vartheta\divideontimes f+r\lambda\divideontimes f+s\Theta\divideontimes F+r\Lambda\divideontimes F=s\left(\vartheta+r/s\lambda\right)\divideontimes f+s\left(\Theta+r/s\Lambda\right)\divideontimes F\Longrightarrow$$

$$\vartheta+r/s\lambda=\left(\vartheta+r/s\lambda\right)^{\perp}=\vartheta^{\perp}=\sigma\Longrightarrow\vartheta=\sigma-r/s\lambda:\quad\Theta+r/s\Lambda=\left(\Theta+r/s\Lambda\right)^{\perp}=\Theta^{\perp}=\Sigma\Longrightarrow\Theta=\Sigma-r/s\Lambda$$

$$\vartheta\boxtimes 1_{R}+\lambda\boxtimes e^{*}e=\sigma\boxtimes 1_{R}+\lambda\boxtimes(e^{*}e-r/s):\quad\Theta\boxtimes 1_{L}+\Lambda\boxtimes e\,e^{*}=\Sigma\boxtimes 1_{L}+\Lambda\boxtimes(ee^{*}-r/s)$$

$$\left(\begin{array}{c|c}\begin{matrix}\vartheta\boxtimes 1_{R}+\\ \varkappa\lambda\boxtimes e^{*}e\end{matrix}&\varkappa\Gamma\eta\boxtimes e^{*}\\\hline \xi\Gamma\boxtimes e&\begin{matrix}\Theta\boxtimes 1_{L}+\\ \varkappa\Lambda\boxtimes ee^{*}\end{matrix}\end{array}\right)^{\perp}=\begin{array}{c|c}\vartheta^{\perp}\boxtimes 1_{R}+\varkappa\lambda\boxtimes(e^{*}e-r/s)&\varkappa\Gamma\eta\boxtimes e^{*}\\\hline \xi\Gamma\boxtimes e&\Theta^{\perp}\boxtimes 1_{L}+\varkappa\Lambda\boxtimes(ee^{*}-r/s)\end{array}\in\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;{}^{2}\Big(\,\mathrm{dK\overset{\perp}{e}r}\;\pi_{1}\Big)_{2}\begin{array}{c|c}1&0\\\hline 0&p\end{array}$$

$$\vartheta_{2}-\vartheta_{2}^{\perp}=\begin{array}{c|c}\left(\vartheta-\vartheta^{\perp}+\varkappa\lambda r/s\right)\boxtimes 1_{R}&0\\\hline 0&\left(\Theta-\Theta^{\perp}+\varkappa\Lambda r/s\right)\boxtimes 1_{L}\end{array}\in\begin{array}{c|c}1&0\\\hline 0&p\end{array}\;{}^{2}\Big(\,\mathrm{dKer}\;\pi_{1}\Big)_{2}\begin{array}{c|c}1&0\\\hline 0&p\end{array}$$

$$\left(\begin{array}{c|c}\omega^{0}\boxtimes 1_{R}&\varkappa\Gamma\psi^{0}\boxtimes e^{*}\\\hline \varphi^{0}\Gamma\boxtimes e&\Omega^{0}\boxtimes 1_{L}\end{array}\;\begin{array}{c|c}\omega^{1}\boxtimes 1_{R}&\varkappa\Gamma\psi^{1}\boxtimes e^{*}\\\hline \varphi^{1}\Gamma\boxtimes e&\Omega^{1}\boxtimes 1_{L}\end{array}\right)^{\perp}=$$

$$\begin{array}{c|c}\left(\omega^{0}\boxtimes\omega^{1}\right)\boxtimes 1_{R}+\psi^{0}\varphi^{1}\underset{\varkappa}{\boxtimes}\left(e^{*}e-r/s\right)&\Gamma\left(\psi^{0}\Omega^{1}-\omega^{0}\psi^{1}\right)\underset{\varkappa}{\boxtimes}e^{*}\\\hline \left(\Omega^{0}\varphi^{1}-\varphi^{0}\omega^{1}\right)\Gamma\boxtimes e&\left(\Omega^{0}\boxtimes\Omega^{1}\right)\boxtimes 1_{L}+\varphi^{0}\psi^{1}\underset{\varkappa}{\boxtimes}\left(ee^{*}-r/s\right)\end{array}$$

$${}^{2}\pi_{2}\left(A\right)=\begin{array}{c|c}\begin{array}{c|c}\omega_{R}\boxtimes 1_{R}&\varkappa\Gamma\psi_{1}\boxtimes e^{*}\\\hline \varphi_{1}\Gamma\boxtimes e&\omega_{L}\boxtimes 1_{L}\end{array}&\begin{array}{c|c}0&\varkappa\Gamma\psi_{2}\boxtimes e^{*}\\\hline 0&\omega_{L}''\boxtimes 1_{L}\end{array}\\\hline \begin{array}{c|c}0&0\\\hline \varphi_{2}\Gamma\boxtimes e&\omega_{L}''\boxtimes 1_{L}\end{array}&\begin{array}{c|c}0&0\\\hline 0&\omega_{L}'''\boxtimes 1_{L}\end{array}\end{array}$$

$$
{}^{2}\pi_{2}\left(dA\right)=\begin{array}{c|c|c|c}
\begin{gathered}\left(f_{R}+d\omega_{R}\right)⧖1_{R}+\\ \varkappa\left(\psi_{1}+\varphi_{1}\right)⧖e^{*}e\end{gathered} & -\varkappa\Gamma\left(\omega_{RL}+d\psi_{1}\right)⧖e^{*} & \left(\omega_{LR}+d\varphi_{1}\right)\Gamma⧖e & \begin{gathered}\left(f_{L}+d\omega_{L}\right)⧖1_{L}+\\ \varkappa\left(\psi_{1}+\varphi_{1}\right)⧖ee^{*}\end{gathered}\\
\hline
\begin{gathered}f''_{R}⧖1_{R}+\\ \varkappa\psi_{2}⧖e^{*}e\end{gathered} & \varkappa\Gamma\left(\omega''_{L}-d\psi_{2}\right)⧖e^{*} & \omega''_{L}\Gamma⧖e & \begin{gathered}\left(f''_{L}+d\omega''_{L}\right)⧖1_{L}+\\ \varkappa\psi_{2}⧖ee^{*}\end{gathered}\\
\hline
\begin{gathered}f'_{R}⧖1_{R}+\\ \varkappa\varphi_{2}⧖e^{*}e\end{gathered} & \varkappa\Gamma\omega'_{L}⧖e^{*} & \left(\omega'_{L}+d\varphi_{2}\right)\Gamma⧖e & \begin{gathered}\left(f'_{L}+d\omega'_{L}\right)⧖1_{L}+\\ \varkappa\varphi_{2}⧖ee^{*}\end{gathered}\\
\hline
f'''_{R}⧖1_{R} & \varkappa\Gamma\omega'''_{L}⧖e^{*} & \omega'''_{L}\Gamma⧖e & \left(f'''_{L}+d\omega'''_{L}\right)⧖1_{L}
\end{array}
$$

$$
\Longrightarrow\begin{array}{c|c}1&0\\ \hline 0&p\end{array}\,dA\begin{array}{c|c}1&0\\ \hline 0&p\end{array}=\begin{array}{c|c}
\begin{gathered}\left(f_{R}+d\omega_{R}\right)⧖1_{R}+\\ \varkappa\left(\psi_{1}+\varphi_{1}\right)⧖e^{*}e\end{gathered} & -\varkappa\Gamma\begin{bmatrix}\omega_{RL}+d\psi_{1} & d\psi_{2}-\omega''_{L}\end{bmatrix}⧖e^{*}\\
\hline
\begin{bmatrix}\omega_{LR}+d\varphi_{1}\\ \omega'_{L}+d\varphi_{2}\end{bmatrix}\Gamma⧖e & \begin{gathered}\begin{array}{c|c}f_{L}+d\omega_{L} & f''_{L}+d\omega''_{L}\\ \hline f'_{L}+d\omega'_{L} & f'''_{L}+d\omega'''_{L}\end{array}⧖1_{L}+\\ \varkappa\begin{array}{c|c}\psi_{1}+\varphi_{1} & \psi_{2}\\ \hline \varphi_{2} & 0\end{array}⧖ee^{*}\end{gathered}
\end{array}
$$

$$
d\varphi+\Omega\varepsilon-\varepsilon\omega=\begin{bmatrix}d\varphi_{1}\\ d\varphi_{2}\end{bmatrix}+\begin{array}{c|c}\omega_{L}&\omega''_{L}\\ \hline \omega'_{L}&\omega'''_{L}\end{array}\begin{bmatrix}1\\0\end{bmatrix}-\begin{bmatrix}1\\0\end{bmatrix}\omega_{R}=\begin{bmatrix}\omega_{L}-\omega_{R}+d\varphi_{1}\\ \omega'_{L}+d\varphi_{2}\end{bmatrix}
$$

$$
d\psi+\omega\,\varepsilon^{*}-\varepsilon^{*}\,\Omega=\begin{bmatrix}d\psi_{1} & d\psi_{2}\end{bmatrix}+\omega_{R}\begin{bmatrix}1 & 0\end{bmatrix}-\begin{bmatrix}1 & 0\end{bmatrix}\begin{array}{c|c}\omega_{L}&\omega''_{L}\\ \hline \omega'_{L}&\omega'''_{L}\end{array}=\begin{bmatrix}\omega_{R}-\omega_{L}+d\psi_{1} & d\psi_{2}-\omega''_{L}\end{bmatrix}
$$

$$
\varphi\,\varepsilon^{*}+\varepsilon\psi=\begin{array}{c|c}\psi_{1}&0\\ \hline \varphi_{2}&0\end{array}+\begin{array}{c|c}\psi_{1}&\psi_{2}\\ \hline 0&0\end{array}=\begin{array}{c|c}\psi_{1}+\varphi_{1}&\psi_{2}\\ \hline \varphi_{2}&0\end{array}
$$