$$\overbrace{\underbrace{w\overset{*}{e}_i x} ⧖ e_i}\,\underline{\underline{\psi}} = \underbrace{w\overset{*}{e}_i x}\,\underline{e_i\underline{\psi}} = \partial_{w\overset{*}{e}_i x}\,\partial_{e_i}\psi$$

$$\overbrace{w ⧗ \underbrace{e_i \overset{*}{x} e_j}}\, e_i ⧖ e_j = \overbrace{\underbrace{w\overset{*}{e}_i x} ⧗ e_j}\, e_i ⧖ e_j = e_i ⧖ \overbrace{\underbrace{w\overset{*}{e}_i x} ⧗ e_j}\, e_j = e_i ⧖ \underbrace{w\overset{*}{e}_i x}$$

$$\underbrace{w ⧗ b}\,\mathcal{J}_b = \frac{\ell a}{2} w \underline{\mathcal{J}}_b + \underbrace{w\overset{*}{e}_i x}\,\underline{e_i\underline{\mathcal{J}}_b} = \frac{\ell a}{2}\partial_w \mathcal{J}_b + \partial_{w\overset{*}{e}_i x}\,\partial_{e_i}\mathcal{J}_b$$

$$\mathcal{B}_w = \frac{\ell a}{2}\partial_w + \partial_{w\overset{*}{e}_i x}\,\partial_{e_i}$$

$${}^x\overbrace{\ell_w\varphi} = \overbrace{x ⧗ w}\,{}^x\varphi$$

$$\varphi \in \mathcal{P}{:}\psi \in \mathcal{P}_\ell^- \Longrightarrow \overbrace{\ell_w\varphi} ⧗ \psi = \varphi ⧗ \overbrace{\frac{\ell a}{2}\partial_w\psi + \partial_{w\overset{*}{e}_i x}\partial_{e_i}\psi}$$

$${}^z\varphi = {}^z p + {}^z q: \quad p \in \mathcal{P}_\ell{:}q \in \mathcal{P}_\ell^\perp \Longrightarrow {}^b\varphi = {}^b p + {}^b q = {}^b p$$

$$\underbrace{z ⧗ b}\,{}^z p = {}^z h + {}^z k: \quad h \in \mathcal{P}_\ell{:}k \in \mathcal{P}_\ell^\perp$$

$$\underbrace{z ⧗ w}\,{}^z\varphi = \underbrace{z ⧗ b}\,\underbrace{{}^z p + {}^z q} = \underbrace{z ⧗ b}\,{}^z p + \underbrace{z ⧗ b}\,{}^z q = {}^z h + {}^z k + \underbrace{z ⧗ b}\,{}^z q$$

$$\mathrm{rk}\ x \leqslant \ell \Longrightarrow {}^x k = 0 = {}^x q \Longrightarrow \underbrace{x ⧗ w}\,{}^x\varphi = {}^x h + {}^x k + \underbrace{x ⧗ b}\,{}^x q = {}^x h$$

$$\psi = \mathcal{J}_b: \quad \mathrm{rk}\ b \leqslant \ell \Longrightarrow \text{ LHS } = \underbrace{\overbrace{x ⧗ w}\,{}^x\varphi} ⧗ \mathcal{J}_b = h ⧗ \mathcal{J}_b = {}^b\overline{h} = \underbrace{w ⧗ b}\,{}^b\overline{\varphi} = \underbrace{w ⧗ b}\,{}^b\overline{p}$$

$$= \underbrace{w ⧗ b}\,\overbrace{p ⧗ \mathcal{J}_b} = \underbrace{w ⧗ b}\,\overbrace{\varphi ⧗ \mathcal{J}_b} = \varphi ⧗ \overbrace{\underbrace{w ⧗ b}\,\mathcal{J}_b} = \varphi ⧗ \overbrace{\frac{\ell a}{2}\partial_w\mathcal{J}_b + \partial_{w\overset{*}{e}_i x}\partial_{e_i}\mathcal{J}_b} = \text{ RHS}$$

$$\gamma_w(x) ⧗ b = \underbrace{w\overset{*}{u}x} ⧗ b = \overbrace{\underbrace{w\overset{*}{b}x} ⧗ e_i}\,\overbrace{e_i ⧗ u} = \overbrace{\underbrace{w\overset{*}{e}_i x} ⧗ b}\,\overbrace{e_i ⧗ u}$$

$$\mathcal{E}_a^m ⧗ \overbrace{\gamma_w \underline{\mathcal{E}}_b^n} = \mathcal{E}_a^m ⧗ \underbrace{\overbrace{\gamma_w(x) ⧗ b}\,{}^x\underline{\mathcal{E}}_b^{n-}} = \int_{dt}^{\mathbb{R}^>} \varrho(t) \int_{du}^{S_1} {}^a\mathcal{E}_{tu}^m\,\overbrace{\gamma_w(tu) ⧗ b}\,{}^{tu}\underline{\mathcal{E}}_b^{n-}$$

$$= \varrho_{m+n}\int_{du}^{S_1} {}^a\mathcal{E}_u^m\,\overbrace{\gamma_w(u) ⧗ b}\,{}^u\underline{\mathcal{E}}_b^{n-} = \varrho_{m+n}\int_{du}^{S_1} {}^a\mathcal{E}_u^m\,\overbrace{\underbrace{w\overset{*}{e}_i u} ⧗ b}\,\overbrace{e_i ⧗ u}\,{}^u\underline{\mathcal{E}}_b^{n-}$$

$$\psi = \overbrace{\underbrace{w\overset{*}{e}_i x} ⧗ b}\,{}^x\mathcal{E}_b^n = \underbrace{w\overset{*}{e}_i x}\,\underline{\mathcal{E}}_b^{n+} \in \mathcal{H}_0$$

$$w\overset{*}{e}_i\, e_i = \frac{p}{2} w$$

$$e_i\, \underline{\overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}}\,{}^{x}\mathcal{E}^n_b = \left(\frac{p}{2}+n\right) \overbrace{w \bowtie b}\,{}^{x}\mathcal{E}^n_b$$

$$\text{LHS} = \overbrace{\underbrace{w\overset{*}{e}_i e_i} \bowtie b}\,{}^{x}\mathcal{E}^n_b + \overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{e_i \bowtie b}\,{}^{x}\mathcal{E}^{n-}_b = \frac{p}{2}\underbrace{w \bowtie b}\,{}^{x}\mathcal{E}^n_b + \overbrace{\underbrace{w\overset{*}{b}x} \bowtie b}\,{}^{x}\mathcal{E}^{n-}_b$$

$$= \frac{p}{2}\underbrace{w \bowtie b}\,{}^{x}\mathcal{E}^n_b + \overbrace{x \bowtie \underbrace{b\overset{*}{w}b}}\,{}^{x}\mathcal{E}^{n-}_b = \frac{p}{2}\underbrace{w \bowtie b}\,{}^{x}\mathcal{E}^n_b + \overbrace{w \bowtie b}\,\overbrace{x \bowtie b}\,{}^{x}\mathcal{E}^{n-}_b = \text{RHS}$$

$$\underbrace{e_i\overset{*}{e}_j x}\, e_j\, \underline{\underline{\overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}}}\,{}^{x}\mathcal{E}^n_b$$

$$\text{LHS} = \underbrace{e_i\overset{*}{e}_j x}\, \underline{\overbrace{\underbrace{w\overset{*}{e}_i e_j} \bowtie b}\,{}^{x}\mathcal{E}^n_b + \overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{e_j \bowtie b}\,{}^{x}\mathcal{E}^{n-}_b}$$

$$= \overbrace{\underbrace{w\overset{*}{e}_i e_j} \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{e}_j x} \bowtie b}\,{}^{x}\mathcal{E}^{n-}_b + \overbrace{\underbrace{w\overset{*}{e}_i \overbrace{e_i\overset{*}{e}_j x}} \bowtie b}\,\overbrace{e_j \bowtie b}\,{}^{x}\mathcal{E}^{n-}_b + \overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{e_j \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{e}_j x} \bowtie b}\,{}^{x}\mathcal{E}^{n=}_b$$

$$\overbrace{\underbrace{w\overset{*}{e}_i e_j} \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{e}_j x} \bowtie b} = \overbrace{\underbrace{w\overset{*}{b}e_j} \bowtie e_i}\,\overbrace{e_i \bowtie \underbrace{e_j\overset{*}{x}b}} = \underbrace{w\overset{*}{b}e_j} \bowtie \underbrace{e_j\overset{*}{x}b}$$

$$\overbrace{\underbrace{w\overset{*}{e}_i \overbrace{e_i\overset{*}{e}_j x}} \bowtie b}\,\overbrace{e_j \bowtie b} = \overbrace{\underbrace{e_i\overset{*}{e}_j x} \bowtie \underbrace{e_i\overset{*}{w}b}}\,\overbrace{e_j \bowtie b} = \underbrace{\overbrace{e_i \underbrace{e_i\overset{*}{w}b}\, x \bowtie e_j}}_{*}\,\overbrace{e_j \bowtie b} = \overbrace{e_i \underbrace{e_i\overset{*}{w}b}_{*}\, x} \bowtie b$$

$$\overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{e_j \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{e}_j x} \bowtie b} = \overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{e_j \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{b}x} \bowtie e_j} = \overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{b}x} \bowtie b}$$

$$= \overbrace{\underbrace{w\overset{*}{b}x} \bowtie e_i}\,\overbrace{e_i \bowtie \underbrace{b\overset{*}{x}b}} = \underbrace{w\overset{*}{b}x} \bowtie \underbrace{b\overset{*}{x}b} = \overbrace{\underbrace{w\overset{*}{b}x} \bowtie b}\,\overbrace{x \bowtie b} = \overbrace{w \bowtie \underbrace{b\overset{*}{x}b}}\,\overbrace{x \bowtie b} = \overbrace{w \bowtie b}\,\overbrace{x \bowtie b}\,\overbrace{x \bowtie b}$$

$$\overbrace{\underbrace{w\overset{*}{e}_i x} \bowtie b}\,\overbrace{e_j \bowtie b}\,\overbrace{\underbrace{e_i\overset{*}{e}_j x} \bowtie b}\,{}^{x}\mathcal{E}^{n=}_b = \overbrace{w \bowtie b}\,\overbrace{x \bowtie b}\,\overbrace{x \bowtie b}\,{}^{x}\mathcal{E}^{n=}_b = n\,(n-1)\,\overbrace{w \bowtie b}\,{}^{x}\mathcal{E}^n_b$$

$$\underbrace{\overbrace{x \bowtie e_i}}\,{}^{x}\varphi \bowtie \psi = \varphi \bowtie \overbrace{\frac{\ell a}{2} e_i \underline{\psi} + \underbrace{e_i\overset{*}{e}_j x}\, e_j \underline{\underline{\psi}}}$$