$$\mathcal{E}_a^m \bowtie \overbrace{\underbrace{w \bowtie u} \mathcal{E}_b^{m+}} = c_{m+}\, \varrho_{2m+1}\, {}^a\mathcal{E}_b^m\, \underbrace{w \bowtie b}$$

$$\text{LHS} = \int\limits_{dt} {}^t\varrho \int\limits_{du}^{S_1} {}^a\mathcal{E}_{tu}^m \underbrace{w \bowtie u}\, {}^{tu}\mathcal{E}_b^{m+} = \int\limits_{dt} {}^t\varrho\, t^{2m+1} \int\limits_{du}^{S_1} {}^a\mathcal{E}_u^m \underbrace{w \bowtie u}\, {}^t\mathcal{E}_b^{m+} = \varrho_{2m+1} \int\limits_{du}^{S_1} {}^a\mathcal{E}_u^m \underbrace{w \bowtie u}\, {}^u\mathcal{E}_b^{m+} = \text{RHS}$$

$$2\,\mathcal{E}_a^m \bowtie \overbrace{\partial_{w \ast x} \mathcal{E}_b^{m+}} = c_{m+}\, \varrho_{2m+1}\, (2m+p)\, {}^a\mathcal{E}_b^m\, \underbrace{w \bowtie b}$$

$$\text{LHS} = \int\limits_{dt} {}^t\varrho\, t^{2m+1} \int\limits_{du}^{S_1} {}^a\mathcal{E}_u^m \overbrace{\partial_{w \ast u}\, {}^u\mathcal{E}_b^{m+}} = c_{m+}\, (m+p/2)\, {}^a\mathcal{E}_b^m\, \underbrace{w \bowtie b} \int\limits_{dt} {}^t\varrho\, t^{2m+1} = \text{RHS}$$

$$\mathcal{E}_a^m \bowtie \overbrace{\underbrace{w \bowtie x} \frac{\underline{\varrho}}{\varrho} \mathcal{E}_b^{m+}} = -2\,(m+1)\, \varrho_{2m+1}\, c_{m+}\, {}^a\mathcal{E}_b^m\, \underbrace{w \bowtie b}$$

$$\int\limits_{dt}^{\mathbb{R}^>} {}^t\underline{\varrho}\, t^{2m+2} = {}^t\varrho\, t^{2m+2} \Big|_0^\infty - 2\,(m+1) \int\limits_{dt}^{\mathbb{R}^>} {}^t\varrho\, t^{2m+1} = -2\,(m+1) \int\limits_{dt}^{\mathbb{R}^>} {}^t\varrho\, t^{2m+1} = -2\,(m+1)\, \varrho_{2m+1}$$

$$\text{LHS} = \int\limits_{dt}^{\mathbb{R}_>} {}^t\underline{\varrho}\, t^{2m+2} \int\limits_{du}^{S_1} {}^a\mathcal{E}_u^m \underbrace{w \bowtie u}\, {}^u\mathcal{E}_b^{m+} = c_{m+}\, {}^a\mathcal{E}_b^m\, \underbrace{w \bowtie b} \int\limits_{dt}^{\mathbb{R}_>} {}^t\underline{\varrho}\, t^{2m+2} = \text{RHS}$$

$$
{}^{x}\overparen{\alpha_w \mathcal{E}^{n}_{b}} = \frac{c_n \varrho_{2n-1}}{(a/2)_{n-}} \left(n - 1 + \frac{\alpha + p}{2} \right) {}^{x}\mathcal{E}^{n-}_{b}\ \underparen{w \bowtie b} - \frac{c_{n+} \varrho_{2n+1}}{(a/2)_{n+}} \left(n + \frac{\alpha + p}{2} \right) {}^{x}\mathcal{E}^{n}_{b}\ \underparen{x \bowtie w}
$$

$$
\begin{aligned}
\text{LHS} &= \mathcal{J}_x \barwedge \overparen{\alpha_w \mathcal{E}^{n}_{b}} = 2\,\mathcal{J}_x \barwedge \overparen{\partial_{w\overset{*}{u}x} \mathcal{E}^{n}_{b}} + \mathcal{J}_x \barwedge \overparen{\underparen{w \bowtie u} \left(1 + \frac{\alpha - p}{2} + \alpha \partial_x \right) \mathcal{E}^{n}_{b}} + \frac{1+\alpha}{2} \mathcal{J}_x \barwedge \overparen{\underparen{w \bowtie x} \frac{\varrho}{\varrho} \mathcal{E}^{n}_{b}} \\
&+ \overparen{\underparen{w \bowtie u} \mathcal{J}_x} \barwedge \underparen{\overparen{1 + \frac{\alpha - p}{2} + \alpha \partial_x \mathcal{E}^{n}_{b}}} + \frac{1+\alpha}{2} \overparen{\underparen{w \bowtie x} \frac{\varrho}{\varrho} \mathcal{J}_x} \barwedge \mathcal{E}^{n}_{b} = 2\,\mathcal{J}_x \barwedge \overparen{\partial_{w\overset{*}{u}x} \mathcal{E}^{n}_{b}} \\
&+ \left(1 + \frac{\alpha - p}{2} + \alpha n \right) \left(\mathcal{J}_x \barwedge \overparen{\underparen{w \bowtie u} \mathcal{E}^{n}_{b}} + \overparen{\underparen{w \bowtie u} \mathcal{J}_x} \barwedge \mathcal{E}^{n}_{b} \right) + \frac{1+\alpha}{2} \left(\mathcal{J}_x \barwedge \overparen{\underparen{w \bowtie x} \frac{\varrho}{\varrho} \mathcal{E}^{n}_{b}} + \overparen{\underparen{w \bowtie x} \frac{\varrho}{\varrho} \mathcal{J}_x} \barwedge \mathcal{E}^{n}_{b} \right) \\
&= 2 \frac{\mathcal{E}^{n-}_{x}}{(a/2)_{n-}} \barwedge \overparen{\partial_{w\overset{*}{u}x} \mathcal{E}^{n}_{b}} + \left(1 + \frac{\alpha - p}{2} + \alpha n \right) \left(\frac{\mathcal{E}^{n-}_{x}}{(a/2)_{n-}} \barwedge \overparen{\underparen{w \bowtie u} \mathcal{E}^{n}_{b}} + \overparen{\underparen{w \bowtie u} \frac{\mathcal{E}^{n+}_{x}}{(a/2)_{n+}}} \barwedge \mathcal{E}^{n}_{b} \right) \\
&+ \frac{1+\alpha}{2} \left(\frac{\mathcal{E}^{n-}_{x}}{(a/2)_{n-}} \barwedge \overparen{\underparen{w \bowtie x} \frac{\varrho}{\varrho} \mathcal{E}^{n}_{b}} + \overparen{\underparen{w \bowtie x} \frac{\varrho}{\varrho} \frac{\mathcal{E}^{n+}_{x}}{(a/2)_{n+}}} \barwedge \mathcal{E}^{n}_{b} \right) = \frac{c_n \varrho_{2n-1}}{(a/2)_{n-}} (2n - 2 + p)\ {}^{x}\mathcal{E}^{n-}_{b}\ \underparen{w \bowtie b} \\
&+ \left(1 + \frac{\alpha - p}{2} + \alpha n \right) \left(\frac{c_n \varrho_{2n-1}}{(a/2)_{n-}} {}^{x}\mathcal{E}^{n-}_{b} \underparen{w \bowtie b} + \frac{c_{n+} \varrho_{2n+1}}{(a/2)_{n+}} {}^{x}\mathcal{E}^{n}_{b} \underparen{x \bowtie w} \right) \\
&- \frac{1+\alpha}{2} \left(\frac{c_n \varrho_{2n-1}}{(a/2)_{n-}} 2n\, {}^{x}\mathcal{E}^{n-}_{b} \underparen{w \bowtie b} + \frac{c_{n+} \varrho_{2n+1}}{(a/2)_{n+}} 2\,(n+1)\, {}^{x}\mathcal{E}^{n}_{b} \underparen{x \bowtie w} \right) \\
&= \frac{c_n \varrho_{2n-1}}{(a/2)_{n-}} {}^{x}\mathcal{E}^{n-}_{b}\ \underparen{w \bowtie b} \left(2n - 2 + p + 1 + \frac{\alpha - p}{2} + \alpha n - (1+\alpha)\, n \right) \\
&+ \frac{c_{n+} \varrho_{2n+1}}{(a/2)_{n+}} {}^{x}\mathcal{E}^{n}_{b}\ \underparen{x \bowtie w} \left(1 + \frac{\alpha - p}{2} + \alpha n - (1+\alpha)(n+1) \right) = \text{RHS}
\end{aligned}
$$

$$
\overparen{\alpha_v \mathcal{E}^{m}_{a}} \barwedge \overparen{\alpha_w \mathcal{E}^{n}_{b}} = \int\limits_{dx} {}^{x}\overline{\alpha_v \mathcal{E}^{m}_{a}}\ {}^{x}\overparen{\alpha_w \mathcal{E}^{n}_{b}} = \int\limits_{dx} \underparen{\overparen{\alpha_v \mathcal{E}^{m}_{a}} \barwedge \mathcal{J}_x}\, \underparen{\mathcal{J}_x \barwedge \overparen{\alpha_w \mathcal{E}^{n}_{b}}}
$$

$$
= \int\limits_{dx} \frac{c_m \varrho_{2m-1}}{(a/2)_{m-}} \left(m - 1 + \frac{\alpha + p}{2} \right) {}^{a}\mathcal{E}^{m-}_{x}\ \underparen{a \bowtie v} \frac{c_n \varrho_{2n-1}}{(a/2)_{n-}} \left(n - 1 + \frac{\alpha + p}{2} \right) {}^{x}\mathcal{E}^{n-}_{b}\ \underparen{w \bowtie b}
$$

$$
-\int\limits_{dx} \frac{c_{m}\varrho_{2m-1}}{(a/2)_{m-}} \left(m-1+\frac{\alpha+p}{2}\right) {}^{a}\mathcal{E}_{x}^{m-} \,\underbrace{a \bowtie v}\, \frac{c_{n+}\varrho_{2n+1}}{(a/2)_{n+}} \left(n+\frac{\alpha+p}{2}\right) {}^{x}\mathcal{E}_{b}^{n} \,\underbrace{x \bowtie w}
$$

$$
-\int\limits_{dx} \frac{c_{m+}\varrho_{2m+1}}{(a/2)_{m+}} \left(m+\frac{\alpha+p}{2}\right) {}^{a}\mathcal{E}_{x}^{m} \,\underbrace{v \bowtie x}\, \frac{c_{n}\varrho_{2n-1}}{(a/2)_{n-}} \left(n-1+\frac{\alpha+p}{2}\right) {}^{x}\mathcal{E}_{b}^{n-} \,\underbrace{w \bowtie b}
$$

$$
+\int\limits_{dx} \frac{c_{m+}\varrho_{2m+1}}{(a/2)_{m+}} \left(m+\frac{\alpha+p}{2}\right) {}^{a}\mathcal{E}_{x}^{m} \,\underbrace{v \bowtie x}\, \frac{c_{n+}\varrho_{2n+1}}{(a/2)_{n+}} \left(n+\frac{\alpha+p}{2}\right) {}^{x}\mathcal{E}_{b}^{n} \,\underbrace{x \bowtie w}
$$

$$
= \frac{c_{m}\varrho_{2m-1}}{(a/2)_{m-}} \frac{c_{n}\varrho_{2n-1}}{(a/2)_{n-}} \left(m-1+\frac{\alpha+p}{2}\right) \left(n-1+\frac{\alpha+p}{2}\right) \underbrace{a \bowtie v}\,\underbrace{w \bowtie b} \int\limits_{dx} {}^{a}\mathcal{E}_{x}^{m-} \bowtie {}^{x}\mathcal{E}_{b}^{n-}
$$

$$
-\frac{c_{m}\varrho_{2m-1}}{(a/2)_{m-}} \frac{c_{n+}\varrho_{2n+1}}{(a/2)_{n+}} \left(m-1+\frac{\alpha+p}{2}\right) \left(n+\frac{\alpha+p}{2}\right) \underbrace{a \bowtie v} \int\limits_{dx} {}^{a}\mathcal{E}_{x}^{m-}\, {}^{x}\mathcal{E}_{b}^{n} \,\underbrace{x \bowtie w}
$$

$$
-\frac{c_{m+}\varrho_{2m+1}}{(a/2)_{m+}} \frac{c_{n}\varrho_{2n-1}}{(a/2)_{n-}} \left(m+\frac{\alpha+p}{2}\right) \left(n-1+\frac{\alpha+p}{2}\right) \underbrace{w \bowtie b} \int\limits_{dx} {}^{a}\mathcal{E}_{x}^{m} \,\underbrace{v \bowtie x}\, {}^{x}\mathcal{E}_{b}^{n-}
$$

$$
+\frac{c_{m+}\varrho_{2m+1}}{(a/2)_{m+}} \frac{c_{n+}\varrho_{2n+1}}{(a/2)_{n+}} \left(m+\frac{\alpha+p}{2}\right) \left(n+\frac{\alpha+p}{2}\right) \int\limits_{dx} {}^{a}\mathcal{E}_{x}^{m} \,\underbrace{v \bowtie x}\, {}^{x}\mathcal{E}_{b}^{n} \,\underbrace{x \bowtie w}
$$

$$
\int\limits_{dx} {}^{a}\mathcal{E}_{x}^{m-}\, {}^{x}\mathcal{E}_{b}^{n-} = \delta_{m}^{n}\, (a/2)_{m-}\, {}^{a}\mathcal{E}_{b}^{m-}
$$

$$
\int\limits_{dx} {}^{a}\mathcal{E}_{x}^{m-}\, {}^{x}\mathcal{E}_{b}^{n} \,\underbrace{x \bowtie w} = c_{m+}\, {}^{a}\mathcal{E}_{b}^{m} \,\underbrace{v \bowtie b}\, \varrho_{m+n}
$$