

$$\begin{aligned}
 \Delta_1' &= \Delta_1 \left[ (2x_1' + 1)u_u + u_x(2u_1' + 1) + u_u u_x \Delta x_{1,2} \right] - \Delta_1 \frac{1}{\Delta x_{1,2}} \\
 &= \Delta_1 \left[ (2(x_1 - \Delta_1 u_x \Delta x_{1,2}) + 1)u_u + \right. \\
 &\quad \left. + u_x(2(u_1 - \Delta_1 u_u \Delta x_{1,2}) + 1) + u_u u_x \Delta x_{1,2} \right] - \Delta_1 \frac{1}{\Delta x_{1,2}} \\
 &= \Delta_1 \left[ (2x_1 + 1)u_u - 2\Delta_1 u_x u_u \Delta x_{1,2} \right. \\
 &\quad \left. + (2u_1 + 1)u_x - 2\Delta_1 u_x u_u \Delta x_{1,2} + u_u u_x \Delta x_{1,2} \right] - \Delta_1 \frac{1}{\Delta x_{1,2}}
 \end{aligned}$$

$$\Delta_1' = \Delta_1 \left[ (2x_1 + 1)u_u + (2u_1 + 1)u_x - 4\Delta_1 u_x u_u \Delta x_{1,2} + u_u u_x \Delta x_{1,2} \right] - \Delta_1 \frac{1}{\Delta x_{1,2}}$$

$$\bar{n}_1' = (2x_1' + 1)(2u_1' + 1) - 2\Delta_1' \Delta x_{1,2}$$

(with  $u_x = 1 = u_u$ )

$$\begin{aligned}
 \bar{n}_1' &= (2x_1' + 1)(2u_1' + 1) - 2 \left\{ \Delta_1 \left[ (2x_1' + 1)u_u + (2u_1' + 1)u_x + u_u u_x \Delta x_{1,2} \right] - \frac{\Delta_1}{\Delta x_{1,2}} \right\} \Delta x_{1,2} \\
 &= (2x_1' + 1)(2u_1' + 1) - \left\{ 2\Delta_1 \left[ (2x_1' + 1)u_u + (2u_1' + 1)u_x + u_u u_x \Delta x_{1,2} \right] \right\} \Delta x_{1,2} \\
 &\quad - \left\{ 2 \cdot \frac{\Delta_1}{\Delta x_{1,2}} \right\} \Delta x_{1,2}
 \end{aligned}$$

$$\begin{aligned}
 \bar{n}_1' &= (2x_1' + 1)(2u_1' + 1) - 2\Delta_1 \Delta x_{1,2} \left[ (2x_1' + 1)u_u + (2u_1' + 1)u_x + u_u u_x \Delta x_{1,2} \right] \\
 &\quad - 2\Delta_1
 \end{aligned}$$

$$\begin{aligned}
 (2x_1' + 1)(2u_1' + 1) &= (2(x_1 - \Delta_1 u_x \Delta x_{1,2}) + 1)(2(u_1 - \Delta_1 u_u \Delta x_{1,2}) + 1) \\
 &= (2x_1 + 1)(2(u_1 - \Delta_1 u_u \Delta x_{1,2}) + 1) \\
 &\quad - (2\Delta_1 u_x \Delta x_{1,2})(2(u_1 - \Delta_1 u_u \Delta x_{1,2}) + 1) \\
 &= (2x_1 + 1)(2u_1 + 1) - (2x_1 + 1)(2\Delta_1 u_u \Delta x_{1,2}) \\
 &\quad - (2\Delta_1 u_x \Delta x_{1,2})(2u_1 + 1) \\
 &\quad + (2\Delta_1 u_x \Delta x_{1,2})(2\Delta_1 u_u \Delta x_{1,2})
 \end{aligned}$$