$$\text{lhs} = \int (\mathcal{L} /@ (X_{i,j}[1]\ X_{i+1,k}[1]\ X_{j+1,k+1}[1]))$$

$$\mathrm{d}\{x_i, x_j, x_k, p_{i+1}, p_{j+1}, p_{k+1}, x_{i+1}, x_{j+1}, x_{k+1}\};$$

$$\text{rhs} = \int (\mathcal{L} /@ (X_{j,k}[1]\ X_{i,k+1}[1]\ X_{i+1,j+1}[1]))$$

$$\mathrm{d}\{x_i, x_j, x_k, x_{i+1}, p_{i+1}, p_{j+1}, p_{k+1}, x_{j+1}, x_{k+1}\};$$

$$\text{lhs} === \text{rhs}$$