$$\boldsymbol{A} = A + A^x \boldsymbol{e}_x + A^y \boldsymbol{e}_y + A^{xy} \boldsymbol{e}_x \wedge \boldsymbol{e}_y$$

$$\boldsymbol{B} = B + B^x \boldsymbol{e}_x + B^y \boldsymbol{e}_y + B^{xy} \boldsymbol{e}_x \wedge \boldsymbol{e}_y$$

$$\begin{aligned} \boldsymbol{AB} = \quad & AB + A^x B^x - A^{xy} B^{xy} + A^y B^y \\ & + (AB^x + A^x B + A^{xy} B^y - A^y B^{xy}) \, \boldsymbol{e}_x \\ & + (AB^y + A^x B^{xy} - A^{xy} B^x + A^y B) \, \boldsymbol{e}_y \\ & + (AB^{xy} + A^x B^y + A^{xy} B - A^y B^x) \, \boldsymbol{e}_x \wedge \boldsymbol{e} \end{aligned}$$

$$\dot{\nabla} \boldsymbol{A} = (A^x + A \boldsymbol{e}_x + A^{xy} \boldsymbol{e}_y + A^y \boldsymbol{e}_x \wedge \boldsymbol{e}_y) \frac{\partial}{\partial x} + (A^y - A^{xy} \boldsymbol{e}_x + A \boldsymbol{e}_y - A^x \boldsymbol{e}_x \wedge \boldsymbol{e}_y) \frac{\partial}{\partial y}$$

$$\boldsymbol{A} \dot{\nabla} = (A^x + A \boldsymbol{e}_x - A^{xy} \boldsymbol{e}_y - A^y \boldsymbol{e}_x \wedge \boldsymbol{e}_y) \frac{\partial}{\partial x} + (A^y + A^{xy} \boldsymbol{e}_x + A \boldsymbol{e}_y + A^x \boldsymbol{e}_x \wedge \boldsymbol{e}_y) \frac{\partial}{\partial y}$$

$$\nabla (\boldsymbol{AB}) - (\nabla \boldsymbol{A}) \, \boldsymbol{B} - \left(\dot{\nabla} \boldsymbol{A} \right) \dot{\boldsymbol{B}} = 0$$

$$\left(\dot{\boldsymbol{A}} \boldsymbol{B} \right) \dot{\nabla} - \boldsymbol{A} \left(\dot{\boldsymbol{B}} \dot{\nabla} \right) - \dot{\boldsymbol{A}} \left(\boldsymbol{B} \dot{\nabla} \right) = 0$$

$$\boldsymbol{A} \wedge \boldsymbol{B} = AB + (AB^x + A^x B) \, \boldsymbol{e}_x + (AB^y + A^y B) \, \boldsymbol{e}_y + (AB^{xy} + A^x B^y + A^{xy} B - A^y B^x) \, \boldsymbol{e}_x \wedge \boldsymbol{e}_y$$

$$\nabla \wedge (\boldsymbol{A} \wedge \boldsymbol{B}) - (\nabla \wedge \boldsymbol{A}) \wedge \boldsymbol{B} - \left(\dot{\nabla} \wedge A \right) \wedge \dot{\boldsymbol{B}} = 0$$

$$\left(\boldsymbol{A} \dot{\wedge} \boldsymbol{B} \right) \wedge \dot{\nabla} - \boldsymbol{A} \wedge \left(\dot{\boldsymbol{B}} \wedge \dot{\nabla} \right) - \dot{\boldsymbol{A}} \wedge \left(\boldsymbol{B} \wedge \dot{\nabla} \right) = 0$$