$$\rightarrow d\gamma = \left(\frac{\partial A_1}{\partial x^1} dx^1 + \frac{\partial A_1}{\partial x^2} dx^2 + \frac{\partial A_1}{\partial x^3} dx^3 + \frac{\partial A}{\partial t} dt \right) \wedge dx^1$$

$$+ \left(\frac{\partial A_2}{\partial x^1} dx^1 + \frac{\partial A_2}{\partial x^2} dx^2 + \frac{\partial A_3}{\partial x^3} dx^3 + \frac{\partial A_2}{\partial t} dt \right) \wedge dx^2$$

$$+ \left(\frac{\partial A_3}{\partial x^1} dx^1 + \frac{\partial A_3}{\partial x^2} dx^2 + \frac{\partial A_3}{\partial x^3} dx^3 + \frac{\partial A_3}{\partial t} dt \right) \wedge dx^3$$

$$- \left(\frac{\partial \varphi}{\partial x^1} dx^1 + \frac{\partial \varphi}{\partial x^2} dx^2 + \frac{\partial \varphi}{\partial x^3} dx^3 + \frac{\partial \varphi}{\partial t} dt \right) \wedge dt$$

$$= \left(\frac{\partial A_3}{\partial x^2} - \frac{\partial A_2}{\partial x^3} \right) dx^2 \wedge dx^3 + \left(\frac{\partial A_1}{\partial x^3} - \frac{\partial A_3}{\partial x^1} \right) dx^3 \wedge dx^1 + \left(\frac{\partial A_2}{\partial x^1} - \frac{\partial A_1}{\partial x^2} \right) dx^1 \wedge dx^2$$

$$- \left(\frac{\partial \varphi}{\partial x^1} + \frac{\partial A_1}{\partial t} \right) dx^1 \wedge dt - \left(\frac{\partial \varphi}{\partial x^2} + \frac{\partial A_2}{\partial t} \right) dx^2 \wedge dt - \left(\frac{\partial \varphi}{\partial x^3} + \frac{\partial A_3}{\partial t} \right) dx^3 \wedge dt$$

$$= B_1 dx^2 \wedge dx^3 + B_2 dx^3 \wedge dx^1 + B_3 dx^1 \wedge dx^2$$

$$+ E_1 dx^1 \wedge dt + E_2 dx^2 \wedge dt + E_3 dx^3 \wedge dt$$

$$= \mathcal{U} \qquad \Delta$$

$$\rightarrow = \left(\frac{\partial}{\partial x^2} \left(\frac{\partial A_2}{\partial x^1} - \frac{\partial A_1}{\partial x^2} \right) - \frac{\partial}{\partial x^3} \left(\frac{\partial A_1}{\partial x^3} - \frac{\partial A_3}{\partial x^1} \right) + \frac{\partial}{\partial t} \left(\frac{\partial \varphi}{\partial x^1} + \frac{\partial A_1}{\partial t} \right) \right) dx^1$$

$$+ \left(\frac{\partial}{\partial x^3} \left(\frac{\partial A_3}{\partial x^2} - \frac{\partial A_2}{\partial x^3} \right) - \frac{\partial}{\partial x^1} \left(\frac{\partial A_2}{\partial x^1} - \frac{\partial A_1}{\partial x^2} \right) + \frac{\partial}{\partial t} \left(\frac{\partial \varphi}{\partial x^2} + \frac{\partial A_2}{\partial t} \right) \right) dx^2$$

$$+ \left(\frac{\partial}{\partial x^1} \left(\frac{\partial A_1}{\partial x^3} - \frac{\partial A_3}{\partial x^1} \right) - \frac{\partial}{\partial x^2} \left(\frac{\partial A_3}{\partial x^2} - \frac{\partial A_2}{\partial x^3} \right) + \frac{\partial}{\partial t} \left(\frac{\partial \varphi}{\partial x^3} + \frac{\partial A_3}{\partial t} \right) \right) dx^3$$

$$+ \left(\frac{\partial}{\partial x^1} \left(-\frac{\partial \varphi}{\partial x^1} - \frac{\partial A_1}{\partial t} \right) + \frac{\partial}{\partial x^2} \left(-\frac{\partial \varphi}{\partial x^2} - \frac{\partial A_2}{\partial t} \right) + \frac{\partial}{\partial x^3} \left(-\frac{\partial \varphi}{\partial x^3} - \frac{\partial A_3}{\partial t} \right) \right) dt$$

$$= \left(\frac{\partial^2}{\partial t^2} - \left(\frac{\partial}{\partial x^1} \right)^2 - \left(\frac{\partial}{\partial x^2} \right)^2 - \left(\frac{\partial}{\partial x^3} \right)^2 \right) A_1 dx^1 + \left(\frac{\partial^2}{\partial x^2 \partial x^1} A_2 + \frac{\partial^2}{\partial x^3 \partial x^1} A_3 + \frac{\partial^2}{\partial t \partial x^1} \varphi \right) dx^1$$

$$+ \left(\frac{\partial^2}{\partial t^2} - \left(\frac{\partial}{\partial x^1} \right)^2 - \left(\frac{\partial}{\partial x^2} \right)^2 - \left(\frac{\partial}{\partial x^3} \right)^2 \right) A_2 dx^2 + \left(\frac{\partial^2}{\partial x^3 \partial x^2} A_3 + \frac{\partial^2}{\partial x^1 \partial x^2} A_1 + \frac{\partial^2}{\partial t \partial x^2} \varphi \right) dx^2$$

$$+ \left(\frac{\partial^2}{\partial t^2} - \left(\frac{\partial}{\partial x^1} \right)^2 - \left(\frac{\partial}{\partial x^2} \right)^2 - \left(\frac{\partial}{\partial x^3} \right)^2 \right) A_3 dx^3 + \left(\frac{\partial^2}{\partial x^1 \partial x^3} A_1 + \frac{\partial^2}{\partial x^2 \partial x^3} A_2 + \frac{\partial^2}{\partial t \partial x^3} \varphi \right) dx^3$$

$$+ \left(- \left(\frac{\partial}{\partial x^1} \right)^2 - \left(\frac{\partial}{\partial x^2} \right)^2 - \left(\frac{\partial}{\partial x^3} \right)^2 \right) \varphi dt + \left(-\frac{\partial^2}{\partial x^1 \partial t} A_1 - \frac{\partial^2}{\partial x^2 \partial t} A_2 - \frac{\partial^2}{\partial x^3 \partial t} A_3 \right) dt$$

$$= (*)$$