$$\vec{F} = (X(x,y), Y(x,y)) \in C^{1}(D)$$

$$\int_{D} (\vec{F} \cdot \vec{n}) dl$$

$$\int_{D} (\frac{\partial X}{\partial x} + \frac{\partial Y}{\partial y}) dx dy \quad \partial D$$

$$O$$

$$\oint_{\partial D} (\vec{F} \cdot \vec{n}) dl = \oint_{\partial D} \vec{F} \cdot (\vec{n} dl) = \oint_{\partial D} (X, Y) \cdot (dy, -dx) = \oint_{\partial D} -Y dx + X dy$$

$$= \iint_{D} \left(\frac{\partial X}{\partial x} + \frac{\partial Y}{\partial y} \right) dx dy = \iint_{D} (\vec{\nabla} \cdot \vec{F}) dx dy$$