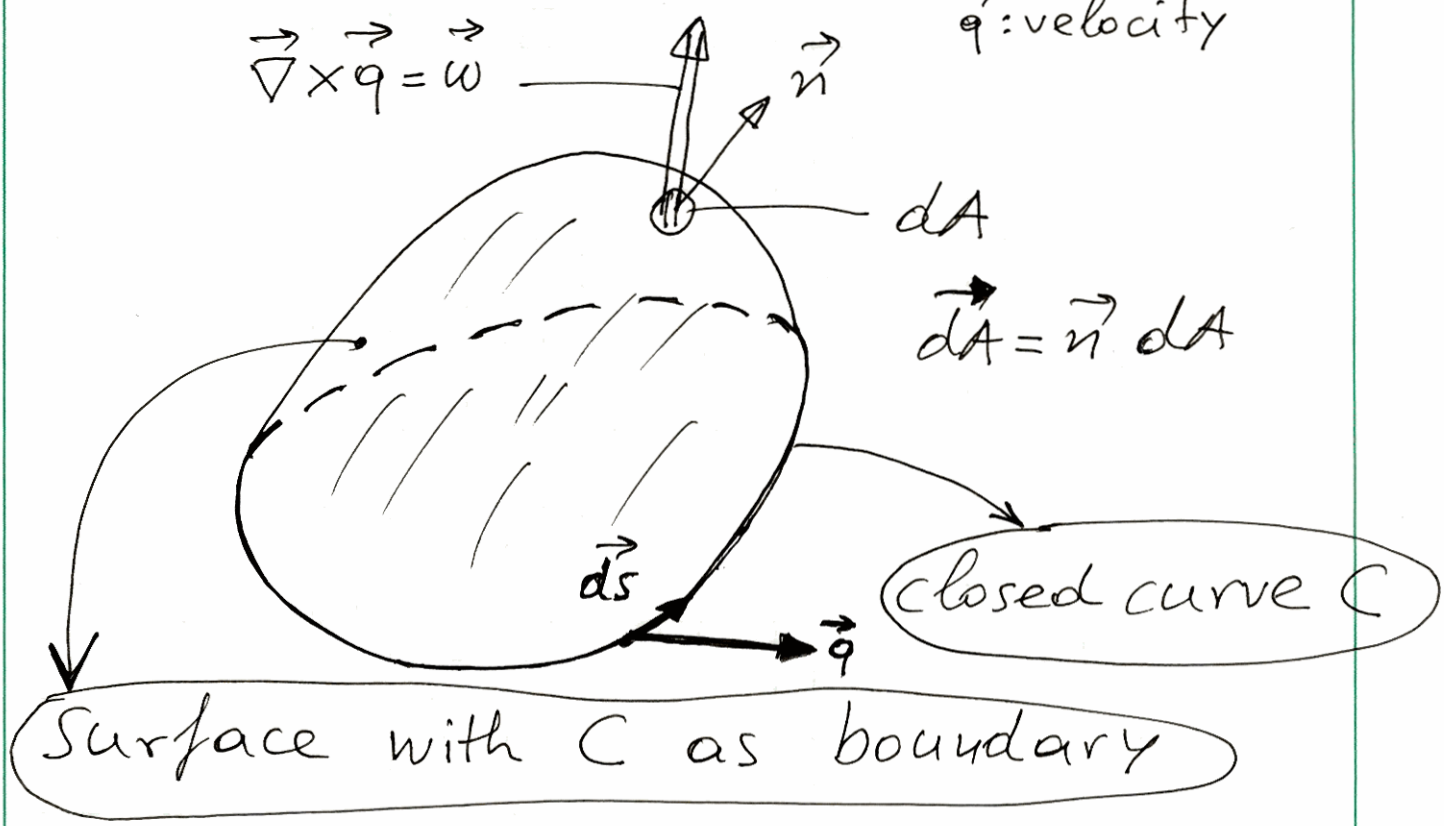
# Stokes' Theorem




Circulation around C: $\Gamma = \oint_C \vec{q} \cdot \vec{ds} = \oint_C q_s \, ds$

$q_s$: component of velocity $\vec{q}$ along direction $\vec{ds}$

$\oint_C$ means integral along closed curve C

Stokes' theorem:

$$\oint_C \vec{q} \cdot \vec{ds} = \iint_A (\vec{\nabla} \times \vec{q}) \cdot \vec{dA} = \iint_A \vec{\omega} \cdot \vec{dA}$$

$\vec{\omega} = \vec{\nabla} \times \vec{q}$ ; vorticity