# Vektoridentiäten

$$\psi = \psi(\vec{r}) \qquad \phi = \phi(\vec{r})$$
$$\vec{A} = \vec{A}(\vec{r}) \qquad \vec{B} = \vec{B}(\vec{r})$$

$$\vec{\nabla}(\psi\varphi) = \psi\vec{\nabla}\varphi + \varphi\vec{\nabla}\psi$$

$$\vec{\nabla}\cdot(\varphi\vec{A}) = \varphi\vec{\nabla}\cdot\vec{A} + \vec{A}\cdot\vec{\nabla}\varphi$$

$$\vec{\nabla}\times(\varphi\vec{A}) = \varphi\vec{\nabla}\times\vec{A} - \vec{A}\times\vec{\nabla}\varphi$$

$$\vec{\nabla}(\vec{A}\cdot\vec{B}) = (\vec{A}\cdot\vec{\nabla})\vec{B} + (\vec{B}\cdot\vec{\nabla})\vec{A} + \vec{A}\times(\vec{\nabla}\times\vec{B}) + \vec{B}\times(\vec{\nabla}\times\vec{A})$$

$$\vec{\nabla}\cdot(\vec{A}\times\vec{B}) = \vec{B}\cdot(\vec{\nabla}\times\vec{A}) - \vec{A}\cdot(\vec{\nabla}\times\vec{B})$$

$$\vec{\nabla}\times(\vec{A}\times\vec{B}) = (\vec{B}\cdot\vec{\nabla})\vec{A} - \vec{B}(\vec{\nabla}\cdot\vec{A}) + \vec{A}(\vec{\nabla}\cdot\vec{B}) - (\vec{A}\cdot\vec{\nabla})\vec{B}$$

$$\vec{\nabla}\cdot(\vec{\nabla}\varphi) = \text{div (grad } \varphi) = \Delta\varphi$$

$$\vec{\nabla}\cdot(\vec{\nabla}\times\vec{A}) = \text{div (rot } \vec{A}) = 0$$

$$\vec{\nabla}\times(\vec{\nabla}\varphi) = \text{rot (grad } \varphi) = 0$$

$$\vec{\nabla}\times(\vec{\nabla}\times\vec{A}) = \text{rot (rot } \vec{A}) = \text{grad (div } \vec{A}) - \Delta\vec{A}$$