UG
Sem I
Unit-II

Explain curl of a field vector →:

This ~~...~~ is ~~...~~ a part from the opration $\vec{\nabla}$. a differentiable vector point function $\vec{A}(x, y, z)$, We may also consider the opration $\vec{\nabla}\times$ on $\vec{A}(x, y, z)$. The vector product $\vec{\nabla}\times\vec{A}$ ~~df~~ defines the curl of $\vec{A}$ written curl $\vec{A}$

$$\therefore \quad \text{curl } \vec{A} = \vec{\nabla}\times\vec{A} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ A_x & A_y & A_z \end{vmatrix}.$$

Thus, it is obvious that curl $\vec{A}$ is a vector function, like div $\vec{A}$. If $\vec{\nabla}\times\vec{A}=0$ then the vector $\vec{A}$ is classified as irrotational. From the ~~...~~ definition of

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div $\vec{A}$ and curl $\vec{A}$, we may write for the two vector function $\vec{A}$ and $\vec{B}$

$$\text{div}(\vec{A}+\vec{B}) = \text{div}\,\vec{A} + \text{div}\,\vec{B}$$

i.e. $$\vec{\nabla}\cdot(\vec{A}+\vec{B}) = \vec{\nabla}\cdot\vec{A} + \vec{\nabla}\cdot\vec{B}$$

and $$\text{curl}(\vec{A}+\vec{B}) = \text{curl}\,\vec{A} + \text{curl}\,\vec{B}$$

i.e. $$\vec{\nabla}\times(\vec{A}+\vec{B}) = \vec{\nabla}\times\vec{A} + \vec{\nabla}\times\vec{B}$$

The opration $\vec{\nabla}$ thus obeys the distributive law.

The physical interpretation of the vecler is related to the rotation or circutation of a vecter field.