

Kirchhoff's Loop Law *from* Faraday's Induction Law

One of the four Maxwell's equations about Electromagnetism asserts—

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad [\text{Faraday's Law}]$$

Or, stated in integral form:

$$\oint \vec{E} \cdot d\vec{l} = -N \frac{d\phi}{dt}$$

Now, let's consider a loop in circuit through which there is no change of flux, that is—

$$\frac{d\phi}{dt} = 0$$

Then, Faraday's law becomes—

$$\oint \vec{E} \cdot d\vec{l} = 0$$

—which is Kirchhoff's Loop Law.

[Self generated]

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