ELECTROMAGNETIC INDUCTION

MAGNETIC FLUX

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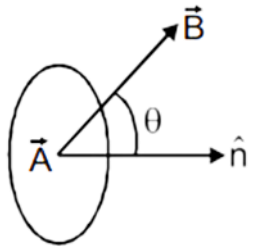
Magnetic flux refers to the measurement of the magnetic field passing through a specific surface area. To illustrate this concept, consider a closed curve that surrounds an area, denoted as 'A' in the figure. Within this region, there exists a uniform magnetic field represented as 'B'. The magnetic flux passing through the designated area 'A,' denoted as 'Φ,' can be calculated using the following formula:



$\Phi = BA\cos(\theta)$

Here, 'θ' represents the angle between the magnetic field vector 'B' and the normal vector to the surface. It's important to note that the normal vector points outward from the surface enclosed by the closed curve, and this direction is used as the direction of the area vector.

If the vector 'B' is perpendicular to the normal vector ($\theta = 90°$), then the magnetic flux through the closed area 'A' will be zero. This occurs because the magnetic field lines do not intersect the surface at any angle, resulting in no net magnetic flux passing through the enclosed area.

The standard unit for measuring magnetic flux is the weber (Wb).

Important Notes:

- The area vector is always perpendicular to the surface it encloses.
- When dealing with open surfaces, it's essential to choose one specific direction for the area vector and maintain that direction consistently throughout the problem.
- For closed surfaces, the outward normal from the surface is used as the direction for the area vector.
- Magnetic flux essentially quantifies the number of magnetic field lines that intersect a particular surface.
- It's important to remember that magnetic field lines always form closed loops, making it necessary to enclose them within a closed surface to calculate magnetic flux accurately.