

Ohm's Law

Introduction

Ohm's Law is a fundamental principle in electrical circuit analysis. It relates the current flowing through a conductor to the voltage across it and the resistance of the conductor. This law is named after German physicist Georg Simon Ohm, who first formulated it in 1827.

INTRODUCTION TO OHM'S LAW

What is Ohm's Law ?



In 1826 *Georg Simon Ohm* discovered that for metallic conductors there is substantially constant ratio of the potential difference between the ends of the conductor.

Ohm's Law states that the current flowing in an electric circuit is directly proportional to the applied voltage and inversely proportional to the resistance of the material.

$$I = \frac{V}{R}$$

Ohm's Law equation

I- current

V-voltage

R- resistance

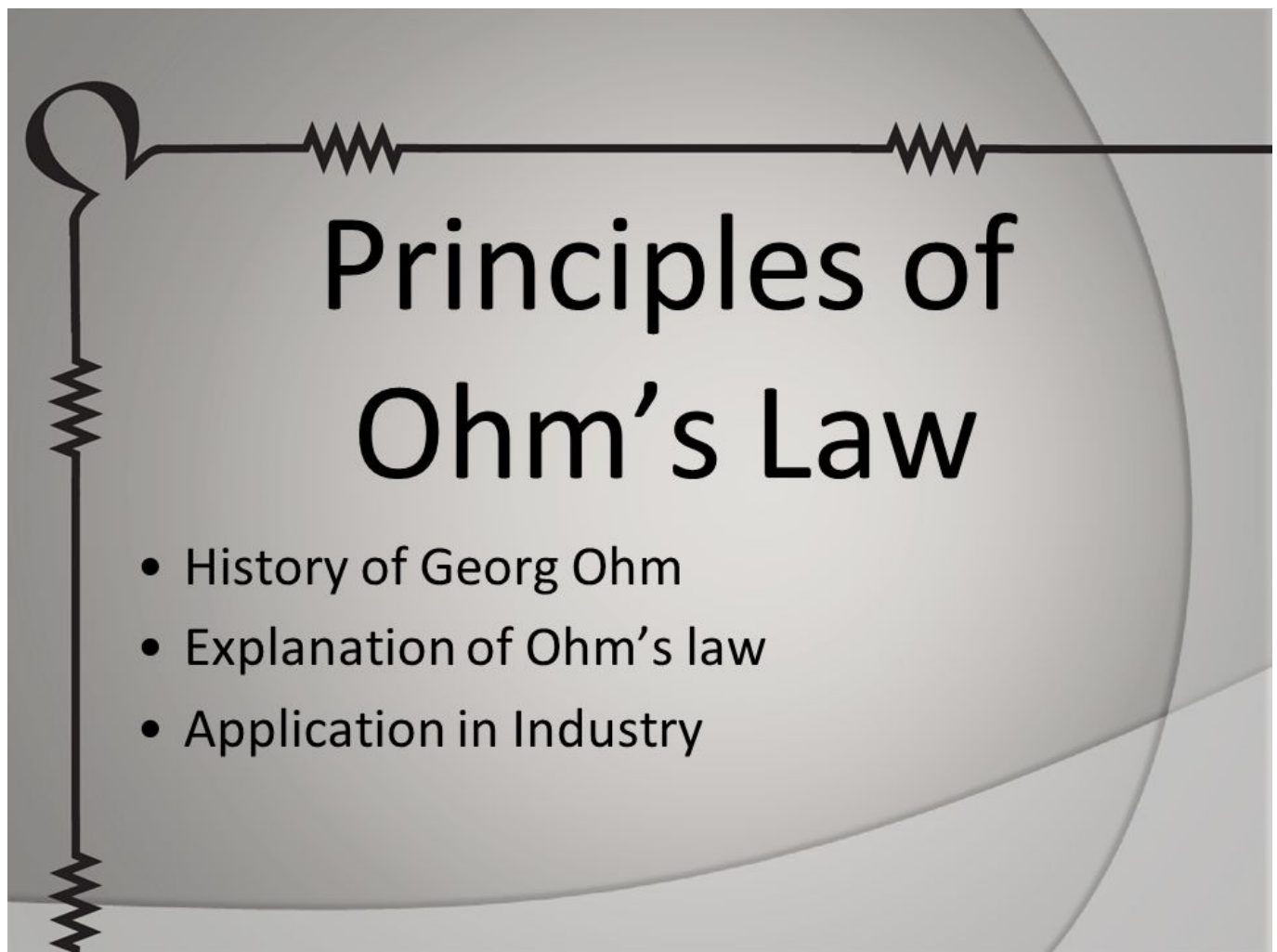
Ohm's law is explained by the following statement.

History

Georg Simon Ohm conducted a series of experiments to understand the relationship between current, voltage, and resistance. He published his findings in a paper titled 'Die galvanische Kette, mathematisch bearbeitet' (The Galvanic Circuit Investigated Mathematically) in 1827. Ohm's Law became an essential part of electrical engineering and has paved the way for various advancements in the field.

Working Principle

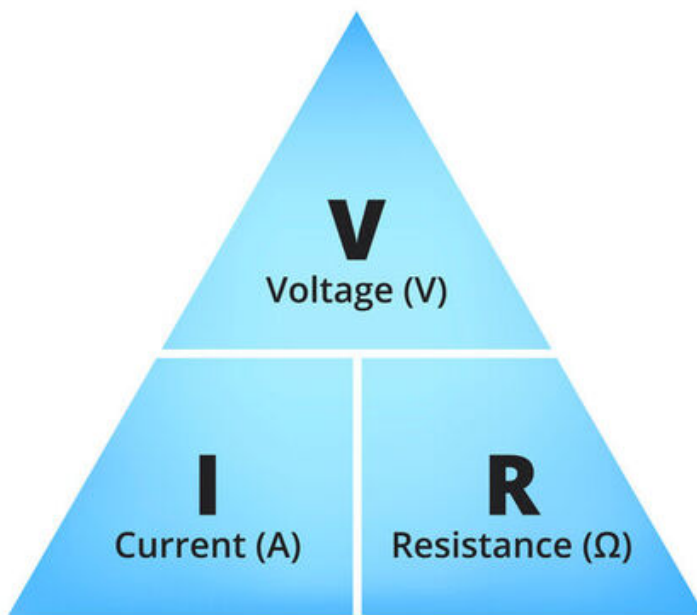
Ohm's Law states that the current (I) flowing through a conductor is directly proportional to the voltage (V) across it and inversely proportional to the resistance (R) of the conductor. Mathematically, it can be expressed as $I = V/R$. This relationship holds true for most conductive materials under normal temperature and operating conditions.



Proof of Law

Ohm's Law can be derived from basic principles of physics and electrical circuit theory. It can be proven using concepts such as voltage, current, and resistance, as well as Ohm's Law itself. By conducting experiments and analyzing the data, the relationship between voltage, current, and resistance can be established, supporting the validity of Ohm's Law.

OHM'S LAW



$$V = I \cdot R$$

$$R = V : I$$

$$I = V : R$$

Advantages

Ohm's Law is a fundamental principle that serves as the foundation for analyzing and designing electrical circuits. It allows engineers and technicians to calculate the current, voltage, and resistance in a circuit, enabling efficient circuit design, troubleshooting, and optimization. Understanding Ohm's Law is essential for various fields, including electronics, power systems, and telecommunications.

Disadvantages

While Ohm's Law is a valuable tool in electrical circuit analysis, it has limitations. It assumes linearity, meaning that the relationship between current, voltage, and resistance remains constant for a given circuit. However, in some cases, non-linear components such as diodes or transistors can violate Ohm's Law. Additionally, Ohm's Law does not account for other factors like temperature, frequency, or electromagnetic interference, which can affect the behavior of circuits.

Conclusion

Ohm's Law is a fundamental principle that provides a simple yet powerful way to understand and analyze electrical circuits. It has revolutionized the field of electronics and has countless applications in various industries. By applying Ohm's Law, engineers and technicians can design efficient circuits, troubleshoot problems, and ensure the safe and reliable operation of electrical systems.