A **130 DC motor** is a small, low-voltage, brushed **Direct Current (DC)** motor that is widely used in hobbyist projects, robotics, and small electronic devices due to its simplicity, affordability, and versatility. Here's a breakdown of what it is and how it works:

## Key Characteristics of a 130 DC Motor

1. **Size**:
    - The "130" refers to its standardized dimensions (about 27mm in length and 20mm in width), making it compact and suitable for small projects.
2. **Power Supply**:
    - Operates on low DC voltages, typically ranging from 1.5V to 6V, although some can handle up to 12V.
    - Higher voltage increases speed and torque but can overheat the motor if it's too high.
3. **Speed and Torque**:
    - Generally designed for high speed with relatively low torque. Gears are often added in applications requiring higher torque.
4. **Applications**:
    - Used in toys, fans, small vehicles, DIY electronics, and other low-power motorized devices.

## How a 130 DC Motor Works

A brushed DC motor like the 130 motor works on the principle of **electromagnetism**. Here's the step-by-step explanation:

1. **Structure**:
    - **Rotor (Armature)**: A coil of wire wound around a core that rotates when current passes through it.
    - **Commutator**: A segmented copper ring attached to the rotor, responsible for reversing the current direction.
    - **Brushes**: Stationary contacts (usually made of carbon) that transfer electrical current to the commutator.
    - **Magnets**: Permanent magnets or electromagnets that create a static magnetic field inside the motor.
2. **Working Principle**:
    - When electrical current flows through the rotor winding, it generates a magnetic field due to the **Lorentz force**.
    - The magnetic field of the rotor interacts with the magnetic field of the motor's permanent magnets.
    - This interaction produces a force that causes the rotor to spin.

3. **Commutation**:
    - As the rotor spins, the commutator reverses the current direction in the rotor windings, ensuring continuous rotation by maintaining the correct magnetic alignment.
4. **Speed Control**:
    - Speed is controlled by varying the voltage applied to the motor.
    - Pulse Width Modulation (PWM) is often used in electronics to efficiently control motor speed.
5. **Stopping and Reversing**:
    - To stop the motor, the current is cut off.
    - To reverse the rotation, the polarity of the power supply is reversed.

## Advantages

- Simple and inexpensive.
- Easy to integrate with basic circuits.
- Compact size suitable for portable and small-scale applications.
- Works with basic power sources like batteries.

## Limitations

- **Low Torque**: The motor itself has limited torque, requiring gears for high-torque applications.
- **Brush Wear**: Brushes wear out over time, reducing efficiency and lifespan.
- **Heat**: Can overheat if operated beyond its rated voltage or under heavy load for extended periods.
- **Noise**: Produces mechanical noise due to the brushes and commutator.

## Summary

The **130 DC motor** is a versatile and widely-used small motor powered by direct current. It operates using the principles of electromagnetism, and its speed and direction can be easily controlled with basic electronics. While it has some limitations like wear and low torque, it remains a staple for hobbyists and small-scale applications.

[How does an Electric Motor work? (DC Motor)]

[Electromagnetism Basics]

[How Does an Electromagnet Work?]