

Simulation of a Discharge Circuit in Simulink

Title:

Design and Simulation of a Battery Discharge Circuit using MATLAB Simulink

Aim:

To simulate a battery discharge circuit using MATLAB Simulink to analyze the battery's performance during load conditions. The objective is to study how the battery voltage and current vary over time and to determine the effect of different loads on discharge characteristics.

Model Used:

The Simulink model for the discharge circuit includes the following components:

- **Battery Source:** A DC voltage source representing the battery.
- **Load Resistor:** Simulates the electrical load connected to the battery.
- **Switch (optional):** Controls when the load is applied.
- **Current and Voltage Measurement Blocks:** Monitor discharge behavior.
- **Scope Blocks:** Display real-time simulation results for voltage, current, and power.

Toolboxes Used:

- Simulink
- Simscape (optional for more advanced electrical modeling)

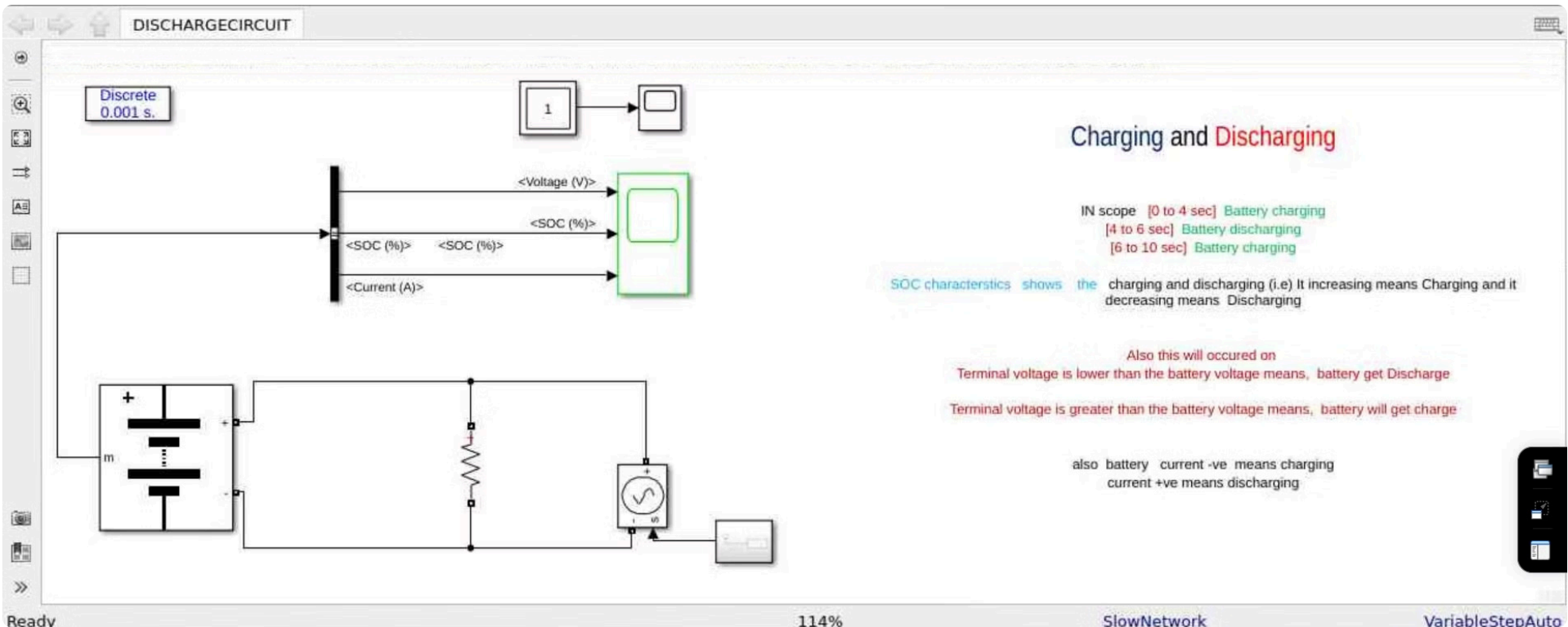
Working:

1. **Battery Block:**
 - Configured with voltage, capacity (Ah), and internal resistance.
 - Acts as the energy source for the discharge circuit.
2. **Load Resistor:**
 - Represents the device or system drawing current from the battery.
 - Value of resistance affects the rate of discharge.
3. **Switch Block (if present):**
 - Enables control over when the discharge begins.
 - Can simulate real-world switching behavior.
4. **Measurement Blocks:**
 - Measure current flowing through the circuit.
 - Track voltage drop across the load and the battery terminals.
5. **Scopes:**
 - Show real-time behavior of the battery.
 - Key parameters include:
 - Discharge current (A)
 - Terminal voltage (V)
 - Power dissipated across the load (W)

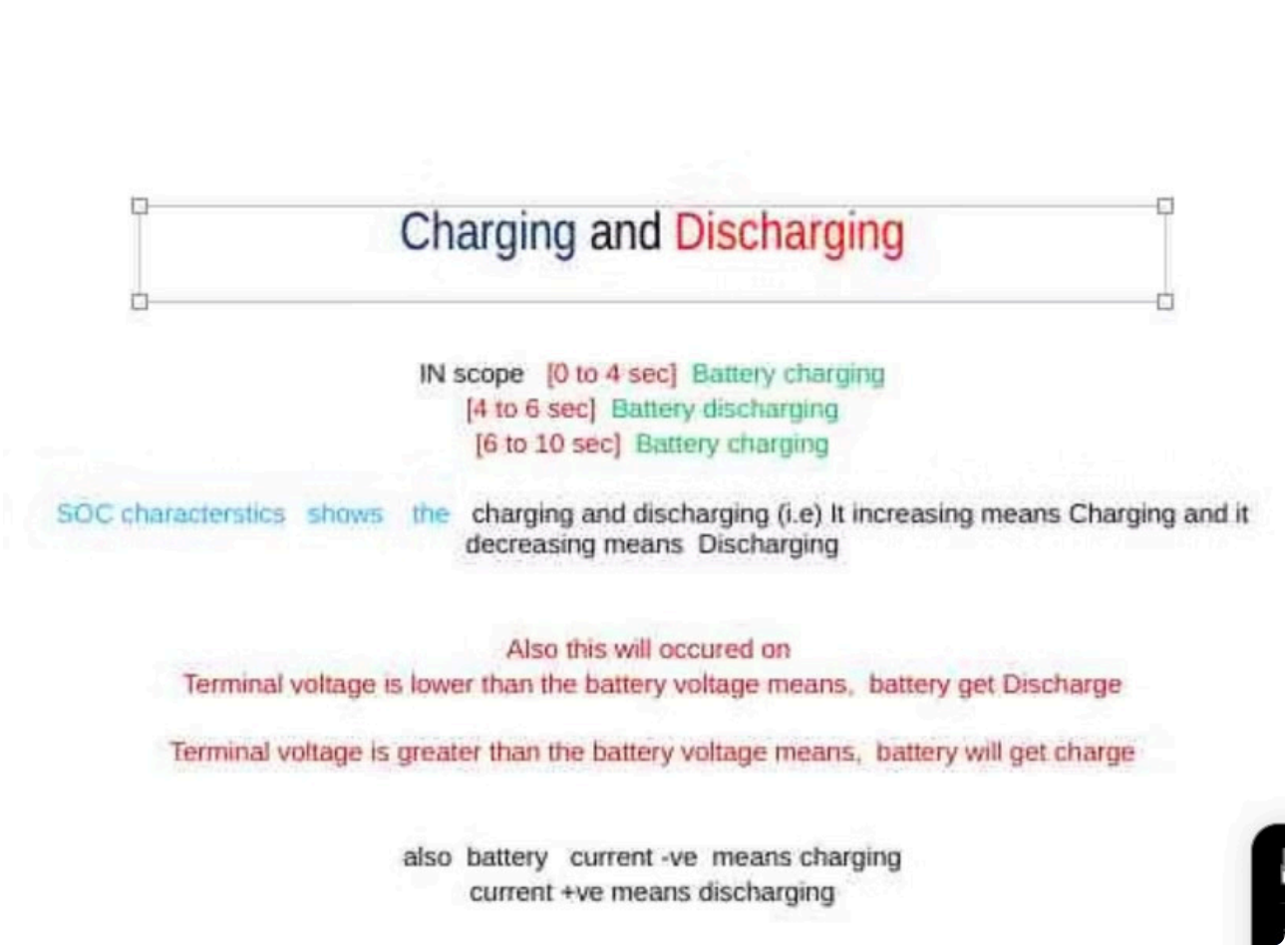
Screenshots (SS):

(Include after simulation is run)

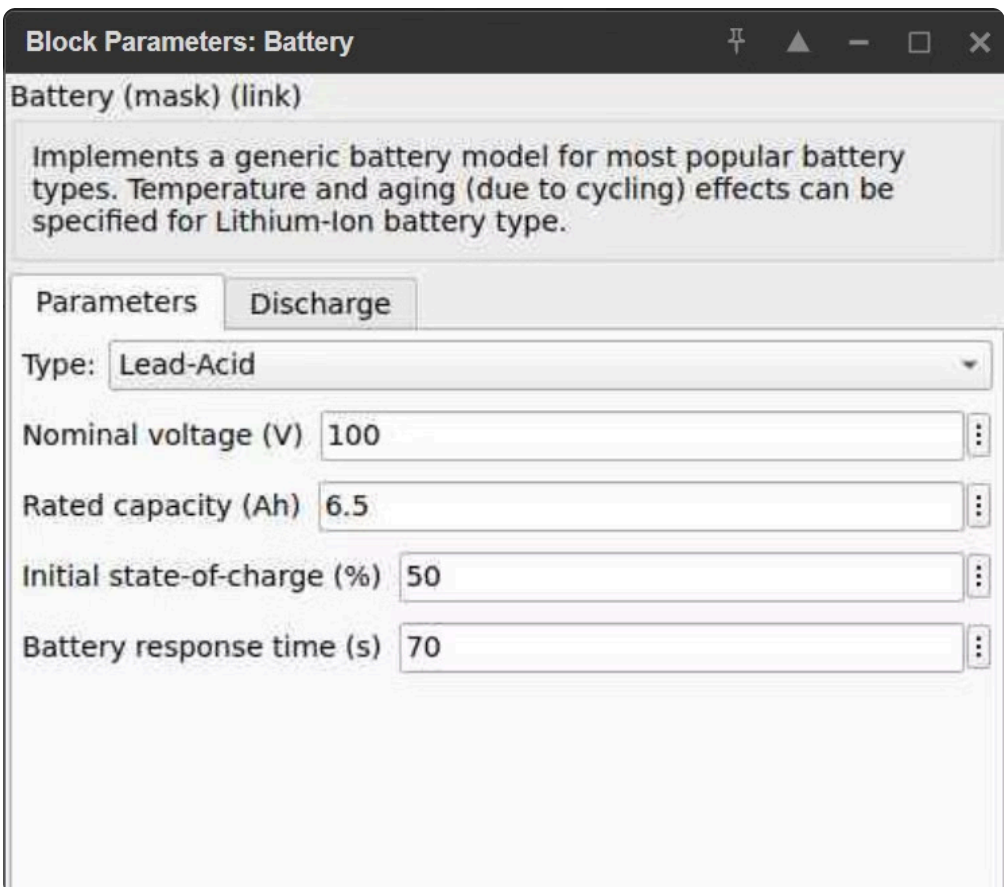
1. Complete Discharge Circuit Diagram



2. Voltage and Current Scopes



1. Battery Block Parameters



Conclusion:

The discharge circuit simulation allows us to visualize and quantify battery behavior under different loading conditions. The results show how load resistance directly influences the discharge rate and battery voltage. Such simulations are essential for battery-powered system design, helping to ensure that batteries are neither over-discharged nor under-utilized. This basic circuit lays the foundation for more advanced battery management systems in electric vehicles, portable electronics, and renewable energy storage.