

Kirchoff's Rules

1. Loop Rule

$$\left(\sum_{i=1}^N V_i \right)_{\text{loop}} = 0$$

Conservation of energy

- Downstream subtract V
- Upstream add V

2. Point Rule

$$\sum_{i=1}^N I_{\text{in}} = \sum_{i=1}^N I_{\text{out}}$$

Conservation of charge

$$I_1 + I_2 = I_{\text{tot}}$$