

Simulate EIS signal

<https://simulate-eis-f02d44a1472f.herokuapp.com/>

This app simulates and visualizes the impedance response of a simple equivalent circuit consisting of a solution resistance in series with the parallel between a polarization resistance and a double layer capacitance (R-Cdl-R configuration). It allows users to visualize the behavior of this circuit in both the frequency domain and the time domain, providing insights into how different circuit elements affect the overall impedance.

Features:

1. Component Selection:

- Users can adjust the values of **electrolyte resistance (Rel)**, **polarization resistance (Rpol)**, and **double-layer capacitance (Cdl)** using interactive sliders. These components are modeled in the equivalent circuit, and their effects on the impedance are shown in the plots.

2. Voltage Signal Parameters:

- The user can set the amplitude and frequency of the applied sinusoidal voltage signal. This signal is used to calculate the current response and impedance in both the time and frequency domains.

3. Simulation Options:

- The app provides two modes of simulation:
 - **Single Frequency Mode:** Users select a single frequency at which the response is calculated and visualized.
 - **Frequency Sweep Mode:** The user can select a start and end frequency for the impedance sweep. The app then simulates the acquisition of the impedance spectrum at 5 points per decade between the selected frequencies.

4. Visualizations:

- **Frequency Domain Plots:**
 - The **Bode plot** shows the impedance modulus and phase as a function of frequency.
 - The **Nyquist plot** represents the impedance in the complex plane, where the real part is plotted against the negative imaginary part.
- **Time Domain Plots:**
 - Time-domain visualizations show the applied voltage signal and the resulting current over time, as well as a **Lissajous plot** (current vs. voltage).
- **Phasor Diagrams:**
 - The phasor plots display the voltage, current, and impedance phasors, offering a visual representation of the magnitude and phase relationships between these variables.

5. Simulation Controls:

- The app includes options for **autoscaling** the plots or setting fixed axis limits. Progress is visually tracked using a progress bar when running frequency sweeps.

