

The hysteresis, slow wave, and piecewise GUIs produces seizures, what each seizure path looks like on the state-space map, and a video of the seizures path as the seizure generates from the parameters set. They are shown for SN/SH (hysteresis), SNIC/SH (slow wave), and Sup/Sup (piecewise). The value of having each parameter being on a slider, so the user can change the values, is to visually see how the parameters influence the seizure created. This can help a user that does not have a background in dynamical systems understand how the hysteresis, slow wave, and piecewise phenomena work.

Hysteresis GUI Read Me

1. Data

- a. curves2.mat – contains the points for the onset and offset bifurcation curves
- b. bifurcation_crossing.mat – contains all bifurcation curves used in the 3d plot of all bifurcation curves
- c. Sphere_mesh.mat- used to create the state-space map
- d. region_mesh.mat- used to create the state-space map

2. Sliders and Labels:

- a. Multiple sliders and labels are added for different parameters:
 - i. Onset Curve Index slider: Controls the onset curve index from the minimum index to the maximum index
 - ii. Offset Curve Index Slider: Controls the offset curve index from the minimum index to the maximum index
 - iii. **K slider**: Controls the k parameter, influencing oscillations in bursts.
 - iv. Dynamical Pink Noise slider: Controls the amount of dynamic pink noise added to the fast variable.
 - v. **Dstar slider**: Controls the dstar parameter. The dstar parameter is one that controls the ratio between how long there is a seizure and how long there is rest(no seizures)
 - vi. N slider: Controls the N parameter. The N parameter determines the properties of the hysteresis.
 - vii. Signal Acquisition Pink Noise Slider: Controls the signal acquisition pink noise percentage that is present in human data.
 - viii. Tmax Slider: Controls the duration of the simulation.
 - ix. Spiking Frequency Adjustment Factor Slider: Adjusts the sampling rate of simulated seizures so that the spiking frequency is consistent with the clinical guidelines of bursting activity.
 - x. Electrode Drift Filter Slider: Adjusts drift filter to emulate residual baseline drift observed from electrodes in a human EEG

3. Descriptions:
 - a. Labels and descriptive text are added to explain the significance and effects of each parameter.
4. Buttons:
 - a. Run Simulation: button to run a simulation with the current slider values. Will show the seizure created.
 - b. Run Simulation with post processing: button to run a simulation with the current slider values. Will show the seizure created when Run Simulation is pressed, but with post-processing to look more like a human EEG.
 - c. Run Video Simulation button: Will show a video of the path of the seizure being displayed on the state-space map
 - d. Save Simulation button to save the generated time series as a .mat file.

Slow Wave GUI Read Me

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 - a. curves2.mat – contains the points for the onset and offset bifurcation curves
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 - viii. Electrode Drift Filter Slider: Adjusts drift filter to emulate residual baseline drift observed from electrodes in a human EEG

3. Descriptions:

- a. Labels and descriptive text are added to explain the significance and effects of each parameter.

4. Buttons:

- a. Run Simulation: button to run a simulation with the current slider values. Will show the seizure created and the seizure path displayed on the state-space map.
- b. Run Simulation with post processing: button to run a simulation with the current slider values. Will show the seizure created when Run Simulation is pressed, but with post-processing to look more like a human EEG. The post processing parameters are signal acquisition pink noise, spiking frequency adjustment factor, and the electrode drift filter.
- c. Run Video Simulation button: will show a video of the path of the seizure being displayed on the state-space map as the seizure is being created with the current slider values. This allows the user to have an intuitive view of how the seizure dynamics unfold during the duration of the seizure.
- d. Save Simulation button to save the generated time series as a .mat file.

Slow Wave GUI Read Me

5. Data

- a. curves2.mat – contains the points for the onset and offset bifurcation curves
- b. bifurcation_crossing.mat – contains all bifurcation curves used in the 3d plot of all bifurcation curves
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- d. region_mesh.mat- used to create the state-space map

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 - vi. Tmax Slider: Controls the duration of the simulation.

- vii. Spiking Frequency Adjustment Factor Slider: Adjusts the sampling rate of simulated seizures so that the spiking frequency is consistent with the clinical guidelines of bursting activity.
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7. Descriptions:

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- a. Run Simulation: button to run a simulation with the current slider values. Will show the seizure created and the seizure path displayed on the state-space map.
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- c. Run Video Simulation button: will show a video of the path of the seizure being displayed on the state-space map as the seizure is being created with the current slider values. This allows the user to have an intuitive view of how the seizure dynamics unfold during the duration of the seizure.
- d. Save Simulation button to save the generated time series as a .mat file.