**Virtual Course on TVB-multiscale Co-Simulation, 07-01-2021**

**Homework**

***We encourage group work!***

*Work on BasalGangliaHomework notebook.*

*Fill-in the solutions to all ??...?? empty fields in the notebook, simulate, and then copy-paste the solutions to the table of page 2 and e-mail it to us as a .doc or .pdf file!*

*(See pages 5 & 6 for an already filled-in example on “rate” interface)*

Detailed instructions:

1. Fill-in the missing values in the notebook in order to implement a “current” (Part A) and a “param” (Part B) interface.
2. For each interface, tune the TVB->NEST “interface\_weights” for the simulation WITH DBS\_GPi dc-current stimulus, until you get an output as similar as possible to the hands-on example of a “rate” interface (see page 5). In particular, try to get 6 “bars” of spikes for Thalamus and the respective activity in the Striatum, for the stimulus duration. Copy-paste the resulting spikes’ raster plots (output of cell 26) and the mean rates of the Striatum populations (output of cell 27).
3. Then, repeat the simulations for each interface WITHOUT stimulus, i.e., for resting-state. Accordingly, copy-paste the resulting spikes’ raster plots (output of cell 26) and the mean rates of the Striatum populations (output of cell 27).
4. Hint: use and combine what you have learnt from both RedWongWang and BasalGanglia notebooks!

|  |  |  |
| --- | --- | --- |
| **Item** | **Fill in the solution…** | **Credits** |
| **Part A. “current” interface** | | |
| ***Stimulus simulation*** | | |
| 1 | “current” | 0 |
| 2 |  | 1 |
| 3 |  | 1 |
| 4 |  | 2 |
| 5 |  | 15 |
| 6 |  | 1 |
| 7 |  | 1 |
| 8 |  | 6 |
| 9 |  | 1 |
| 10 |  | 1 |
| 11 |  | 1 |
| 12 | *Copy and paste plot picture below (page 3)!* | 5 |
| 13 | *Copy and paste here from the output of notebook cell 27!* | 5 |
| ***Resting state simulation*** | | |
| 14 | *Copy and paste plot picture below (page 3)!* | 5 |
| 15 | *Copy and paste here from the output of notebook cell 27!* | 5 |
| **Part B. “param” interface** | | |
| ***Stimulus simulation*** | | |
| 1 | “param” | 0 |
| 2 |  | 1 |
| 3 |  | 1 |
| 4 |  | 2 |
| 5 |  | 2 |
| 6 |  | 15 |
| 7 |  | 6 |
| 8 |  | 1 |
| 9 |  | 2 |
| 10 | *Copy and paste spike raster plot picture below (page 4)!* | 5 |
| 11 | *Copy and paste here from the output of notebook cell 27!* | 5 |
| ***Resting state simulation*** | | |
| 12 | *Copy and paste spike raster plot picture below! (page 4)!* | 5 |
| 13 | *Copy and paste here from the output of notebook cell 27!* | 5 |

*Copy and paste plot picture A12 here!:*

*Copy and paste plot picture A14 here!:*

*Copy and paste plot picture B10 here!:*

*Copy and paste plot picture B12 here!:*

|  |  |  |
| --- | --- | --- |
| **Item** | **Fill in the solution…** | **Credits** |
| **C. Example. “rate” interface** | | |
| ***Stimulus simulation*** | | |
| 1 | “rate” | 0 |
| 2 | [["IdSN", "IiSN"], "E"] | 0 |
| 3 | [nest\_model\_builder.Istr\_nodes\_ids, E\_nodes\_ids] | 0 |
| 4 | "inhomogeneous\_poisson\_generator " | 0 |
| 5 | 10.0 | 0 |
| 6 | tvb\_weight\_fun | 0 |
| 7 | tvb\_delay\_fun | 0 |
| 8 | “R” | 0 |
| 9 | trg\_pop | 0 |
| 10 | None | 0 |
| 11 | target\_nodes | 0 |
| 12 | *Copy and paste spike raster plot picture below!* | 0 |
| 13 | [25.81290619, 26.41320634] | 0 |
| ***Resting state simulation*** | | |
| 14 | *Copy and paste spike raster plot picture below!* | 0 |
| 15 | [13.10655315, 13.40670322] | 0 |

*Copy and paste plot picture C12 here!:*

![Diagram, engineering drawing

Description automatically generated]()

*Copy and paste plot picture C14 here!:*

![Diagram

Description automatically generated]()