TreadmillModel

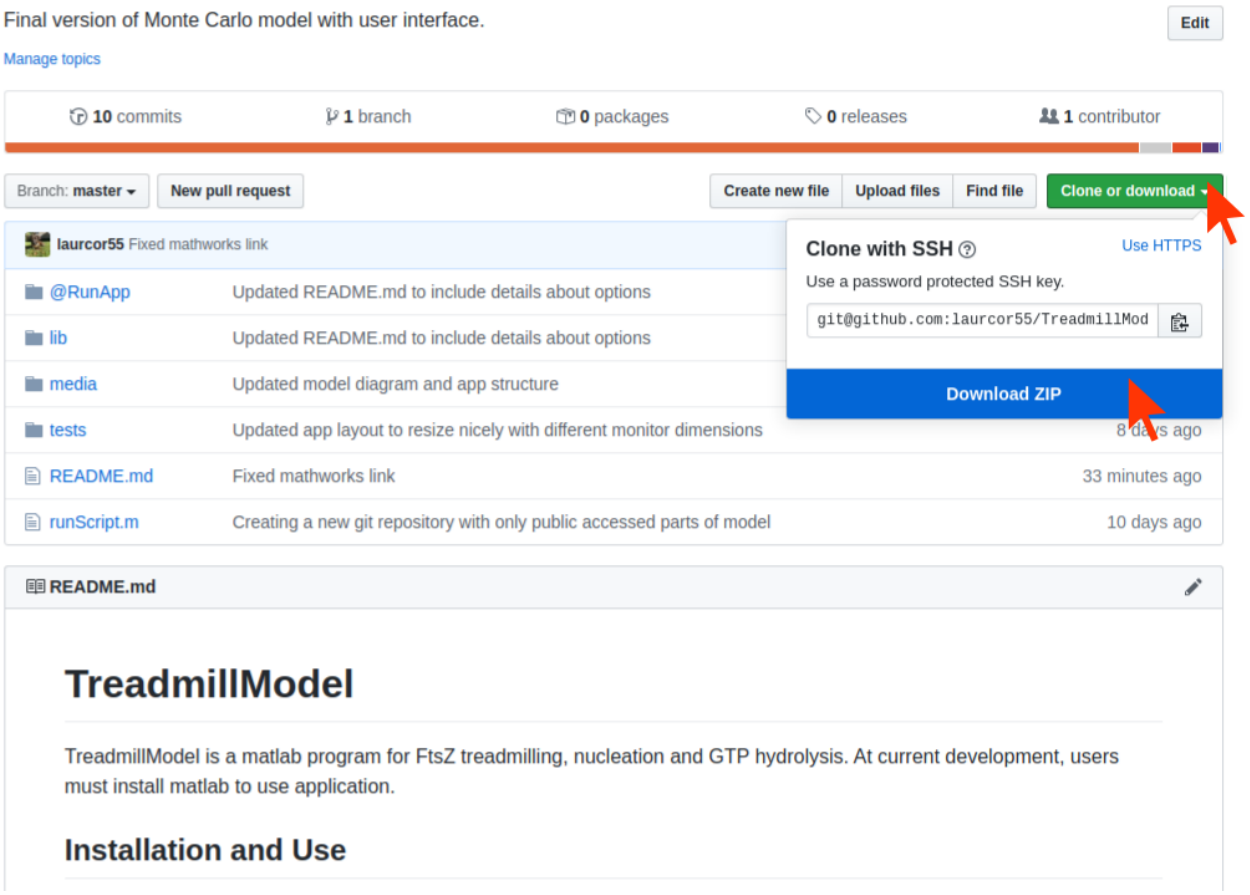
TreadmillModel is a matlab program for FtsZ treadmilling, nucleation and GTP hydrolysis. At current development, users must install matlab to use application.

System Requirements

Access to matlab. Version 2017a - 2019b suggested but backwards compatibility supported. Application was developed to avoid dependencies on toolboxes.

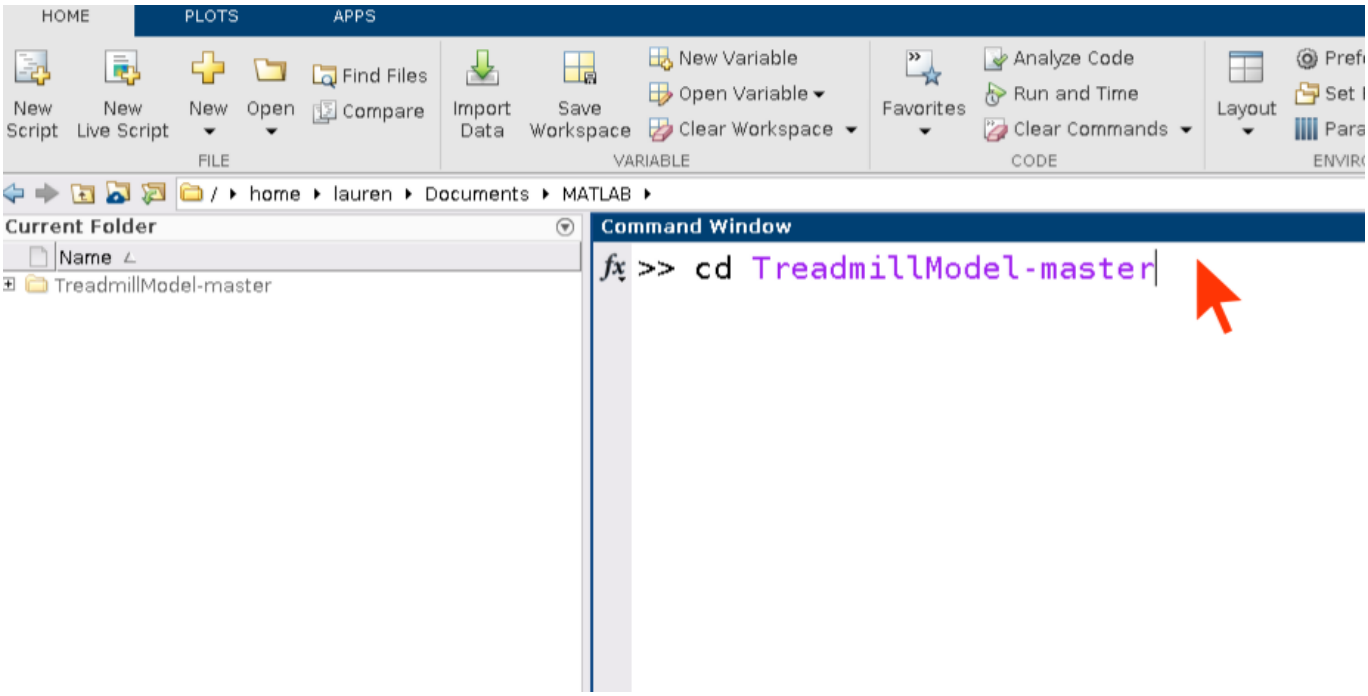
Installation and Running App

1. Install matlab from MathWorks.
2. In web browser, visit GitHub repository. Click **Clone or Download** and **Download Zip**. Unzip folder and move the folder `/TreadmillModel-master` to `Documents/MATLAB` folder

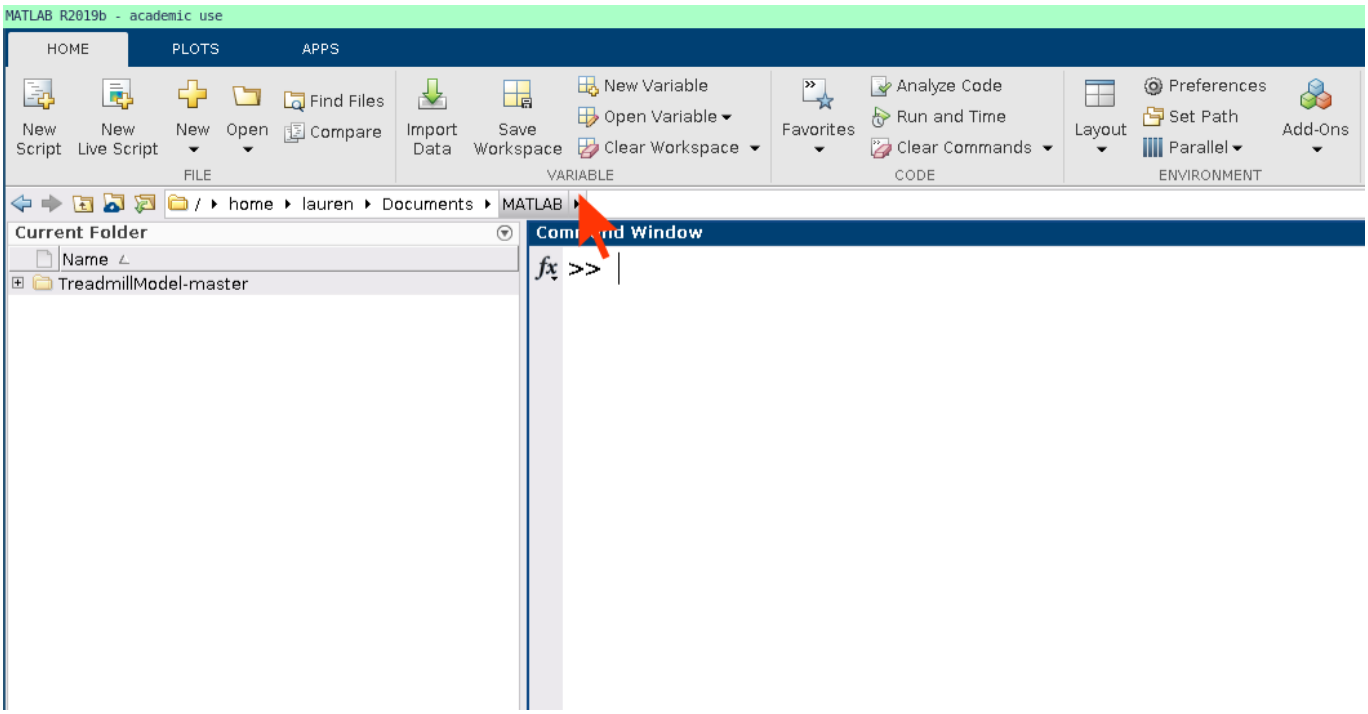


3. Open matlab and navigate to the `TreadmillModel-master` directory by typing the following into the command window.

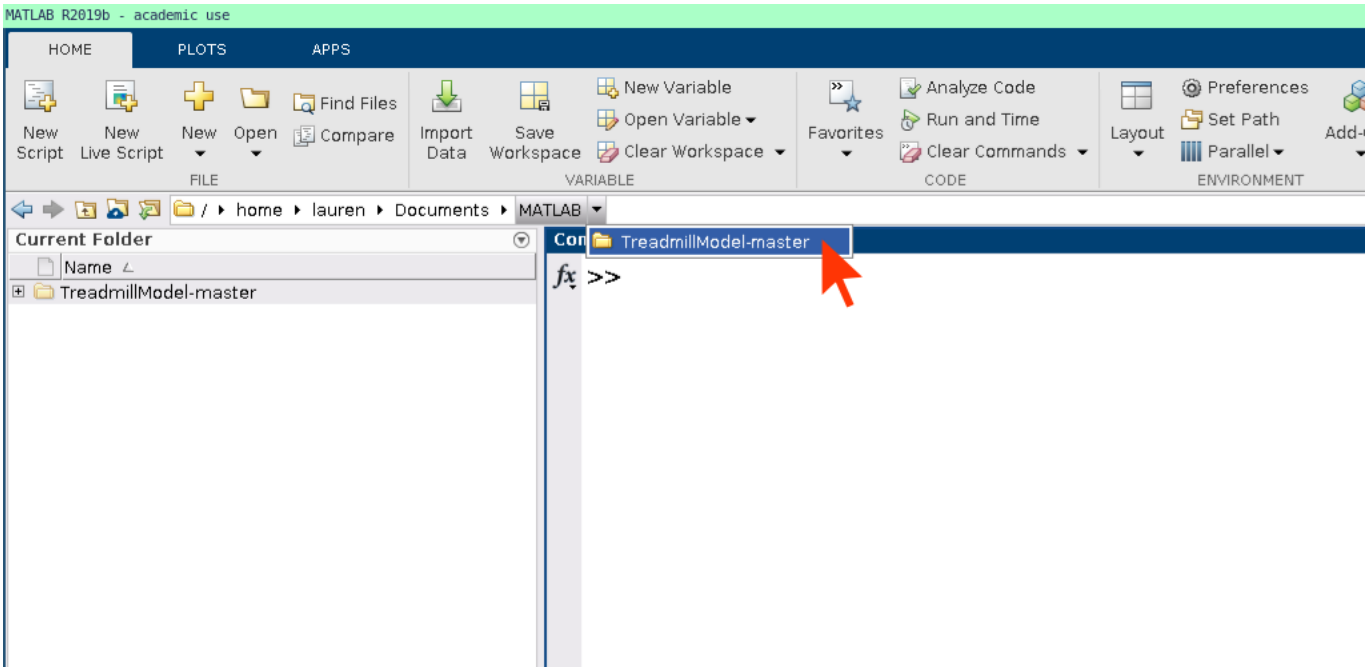
```
>> cd TreadmillModel-master
```



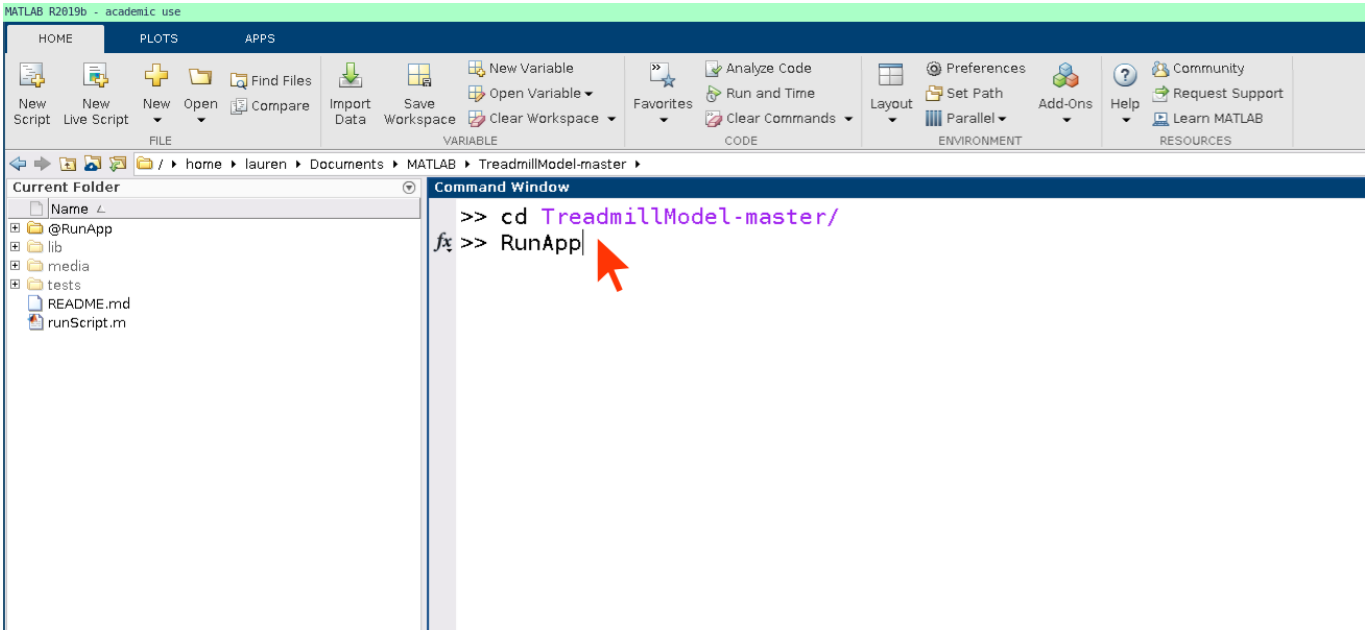
Alternatively, users can navigate to the folder by first clicking the small arrow beside the MATLAB directory in the top navigation bar.



Then, users select **TreadmillModel-master** folder.

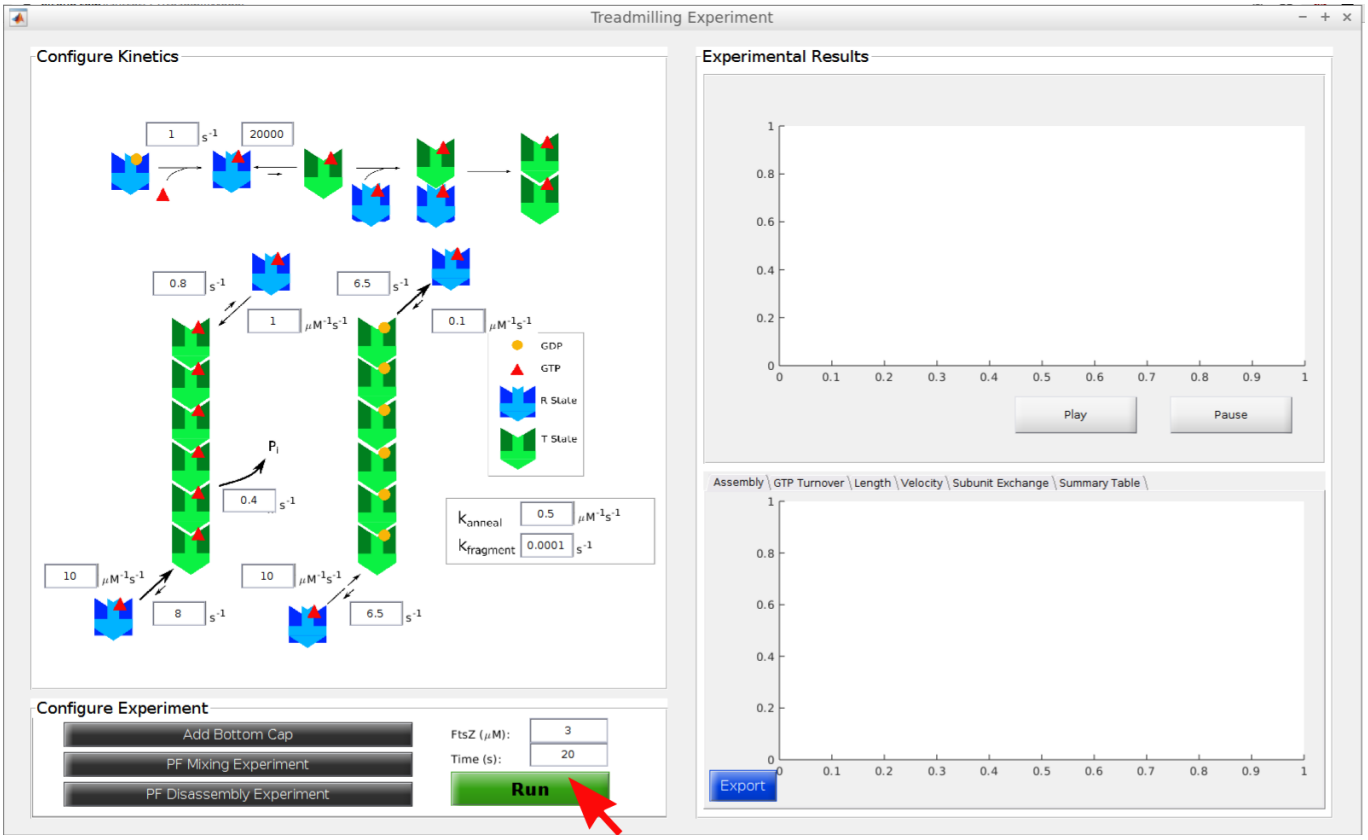


4. Run app by typing RunApp in command window and press **Enter** on the keyboard.



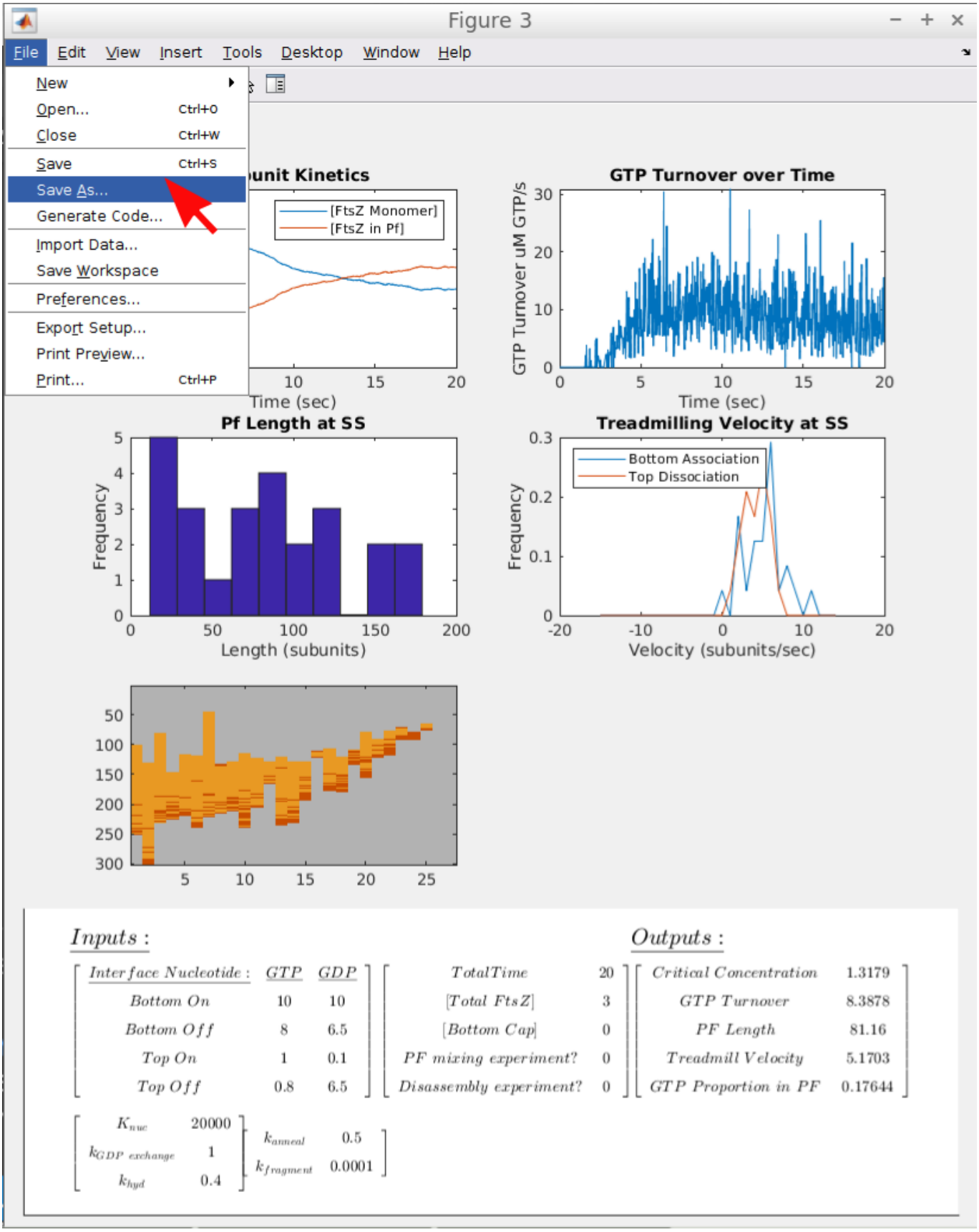
Navigating App Input

The left panel of the screen gives the input parameters, and the right panel shows results. The model comes with a set of kinetic parameters, FtsZ concentration (3 μM) and time (20 s), which can be used for an initial run by clicking the green **Run** button at the bottom. User can change any parameter by changing the number in the input boxes. To run model, click the green **Run** button at the bottom.



The output panel will show the final array of PFs in the top window. Each vertical line is a PF, with length shown on the y axis. GTP is red and GDP is orange. User can reply this as a movie by clicking **Play**, and can **Pause** at any point.

The bottom output panel can be toggled between Assembly, GTP turnover, etc., by clicking on the bar. To obtain a summary of input and output, click the **Export** button. Matlab will generate a figure that contains the input and output data from that particular model run. Save in your preferred format by clicking **File** and **Save As** on the menu bar.



Configuring Experiments

The app can be configured to simulate bottom cappers, PF mixing, and PF disassembly.

Add Bottom Cap

To add a bottom capper, click the gray **Add Bottom Cap** button at the bottom left. In the popup, adjust the kinetic parameters and the concentration of capper with numeric inputs. Press **Apply** and the green **Run** button.

To undo adding a bottom capper, click **Add Bottom Cap**, and input 0 for the **Bottom Cap (μM)** numeric box. Click **Apply**. Accept the warning message. Continue with app.

PF Mixing Experiment

To simulate PF mixing, click the gray **PF Mixing Experiment** button. In the small popup, add a numeric time value in seconds. Click **OK**, then **Run**.

To undo adding a PF mixing experiment, click the **PF Mixing Experiment** button, and click **Cancel** in the popup.

PF Disassembly Experiment

To simulate PF mixing, click the gray **PF Disassembly Experiment** button. In the small popup, add a numeric time value in seconds. Click **OK**, then **Run**.

To undo adding a PF disassembly experiment, click the **PF Disassembly Experiment** button, and click **Cancel** in the popup.