

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.

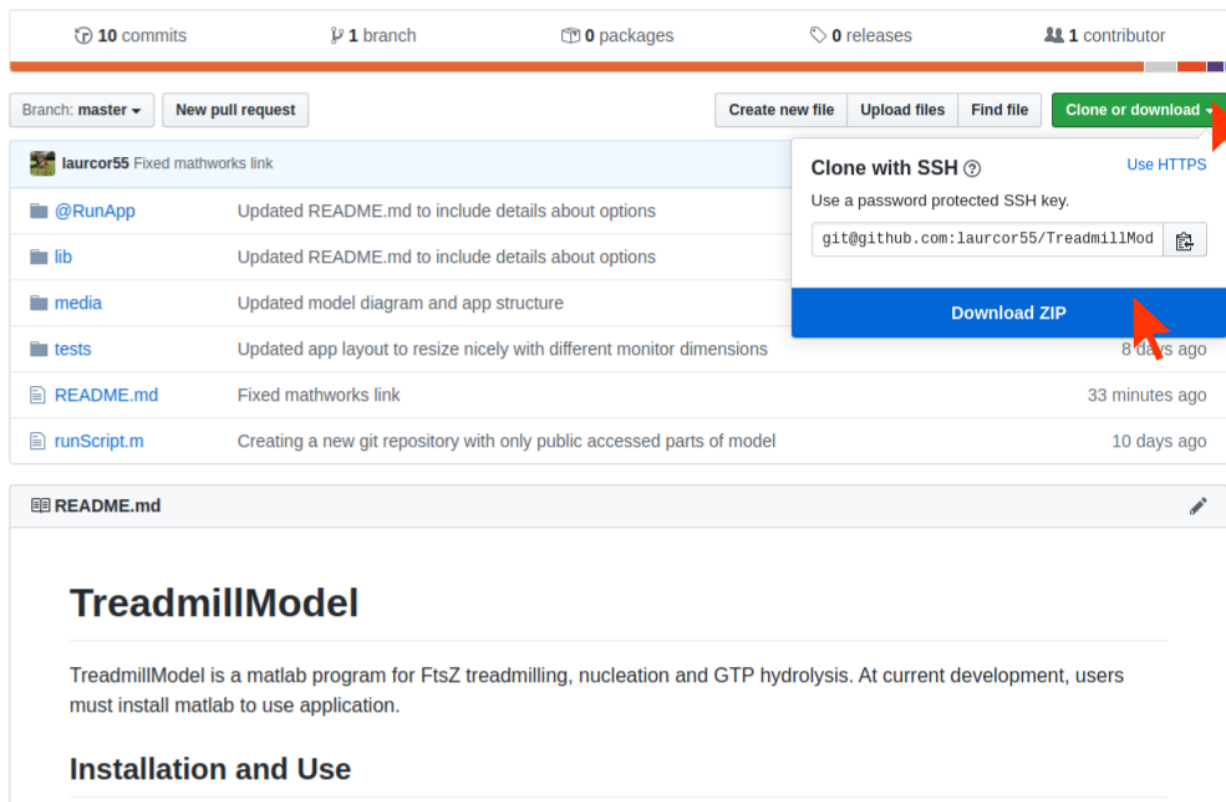
Installation and Running App

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

Final version of Monte Carlo model with user interface.

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10 commits 1 branch 0 packages 0 releases 1 contributor

Branch: master New pull request

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Clone with SSH Use HTTPS

Use a password protected SSH key.

git@github.com:laurcor55/TreadmillMod

Download ZIP

laurcor55 Fixed mathworks link

File/Folder	Description	Time
@RunApp	Updated README.md to include details about options	
lib	Updated README.md to include details about options	
media	Updated model diagram and app structure	
tests	Updated app layout to resize nicely with different monitor dimensions	8 days ago
README.md	Fixed mathworks link	33 minutes ago
runScript.m	Creating a new git repository with only public accessed parts of model	10 days ago

README.md

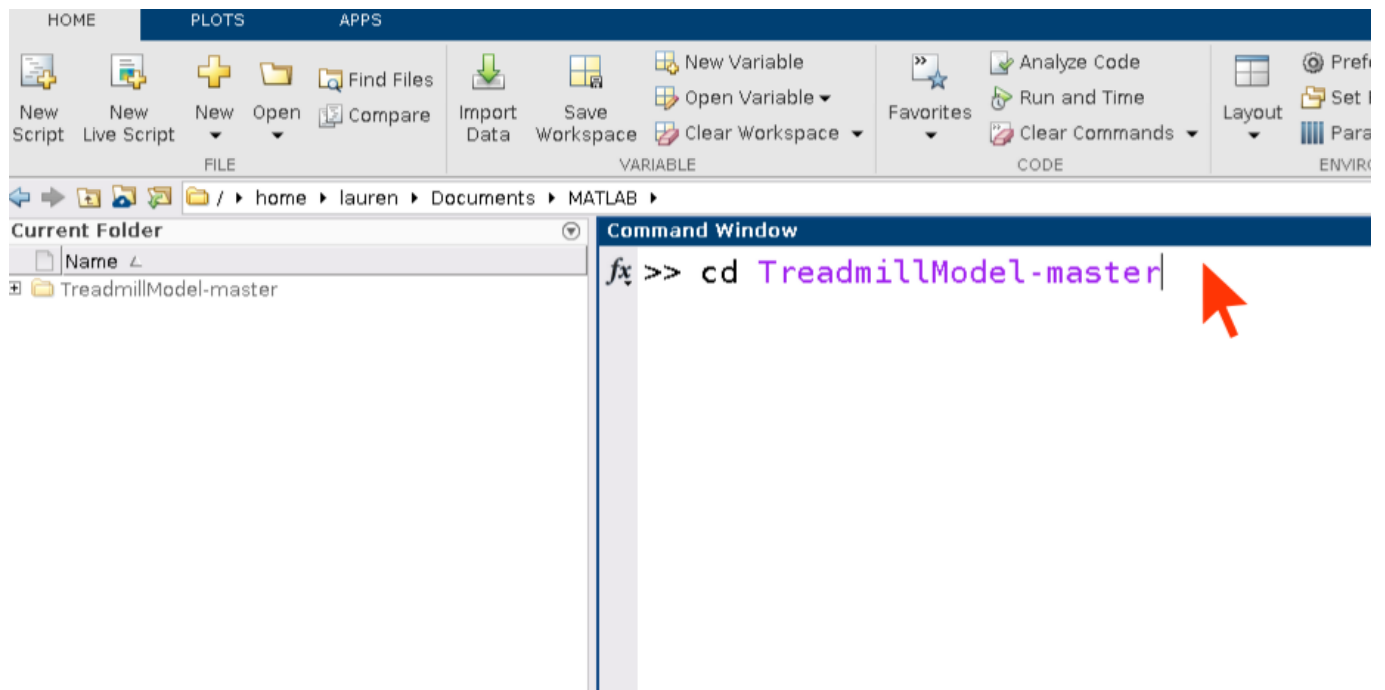
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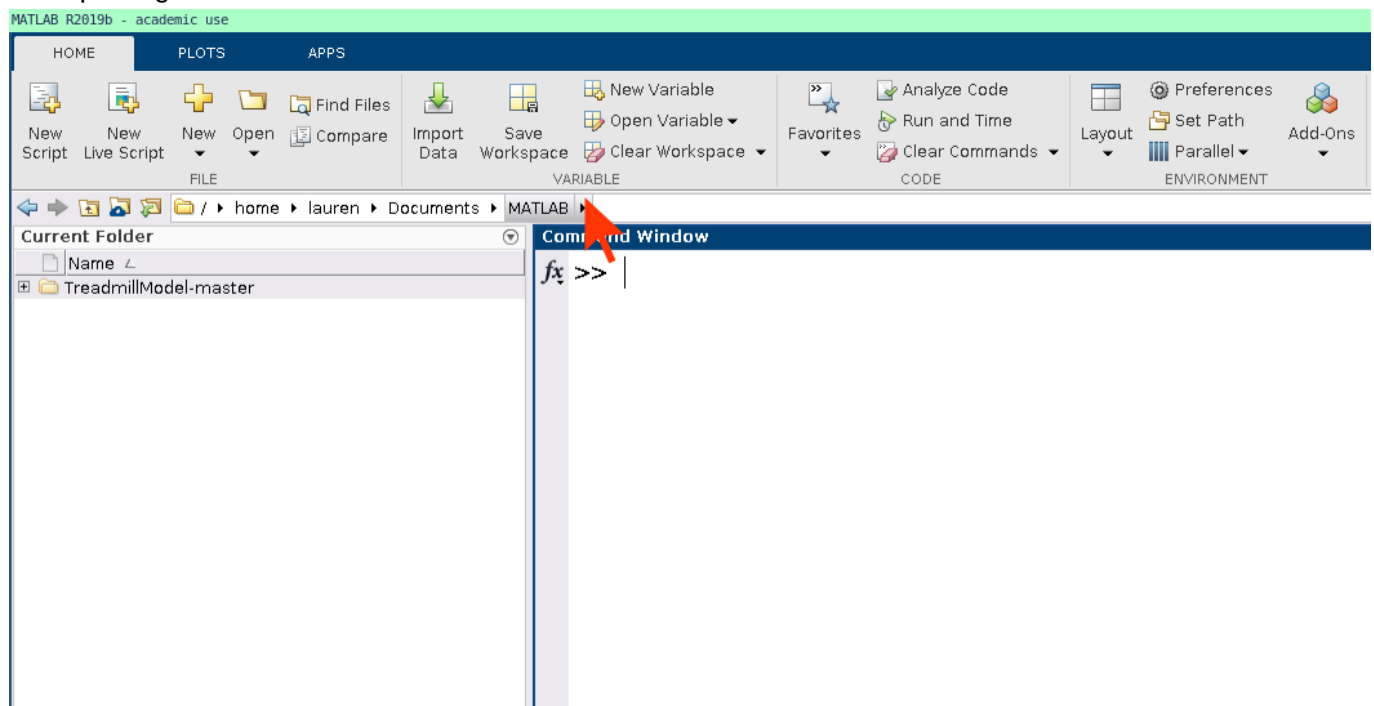
Installation and Use

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

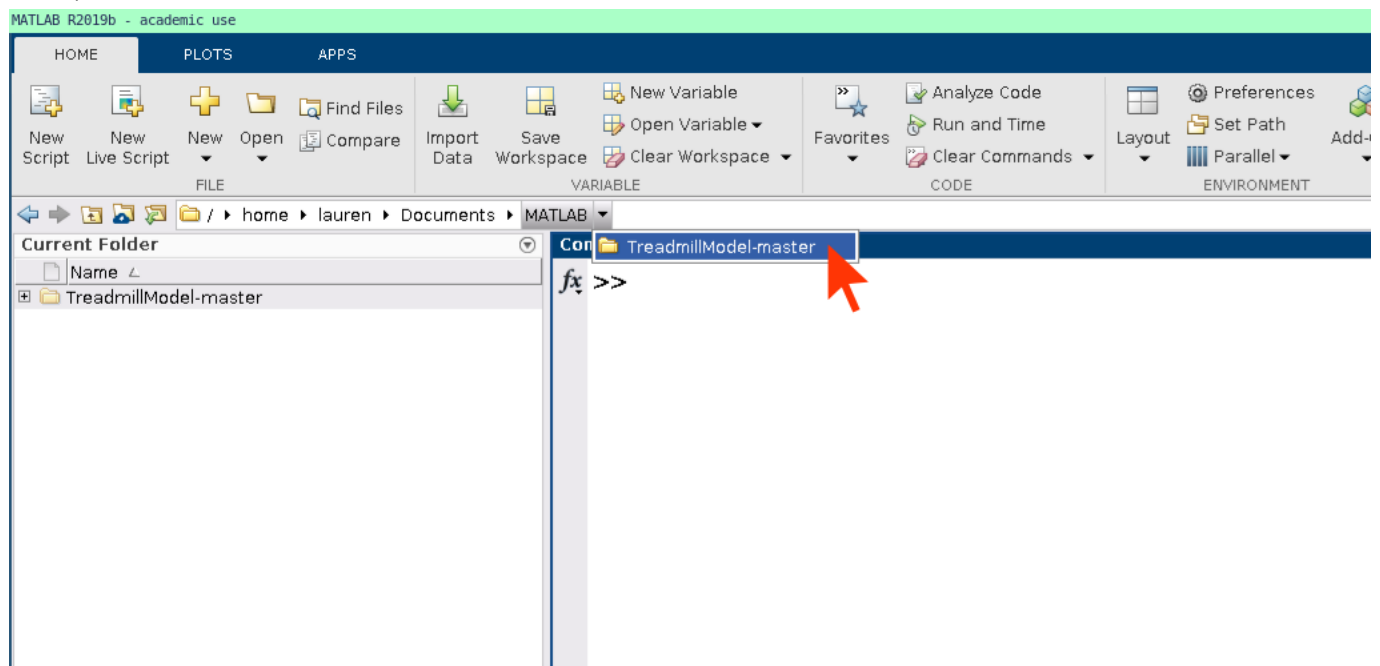
```
>> cd TreadmillModel-master
```



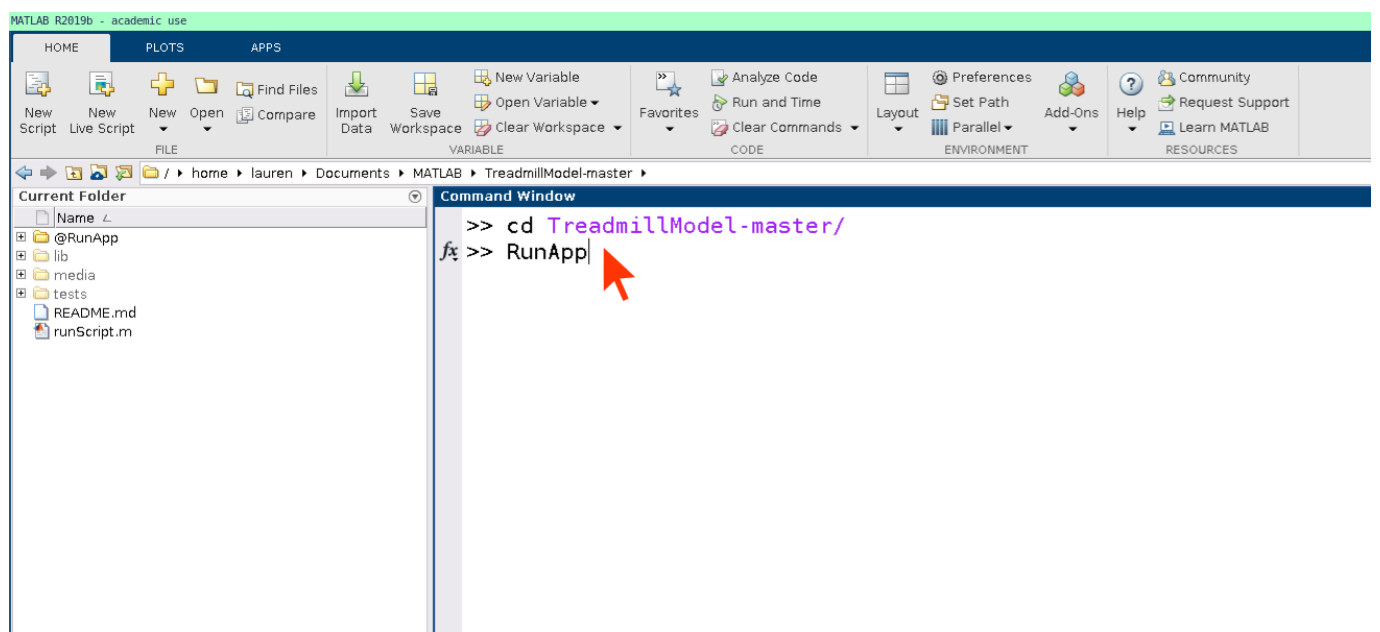
Alternatively, users can navigate to the folder by first clicking the small arrow beside the MATLAB directory in the top navigation bar.



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

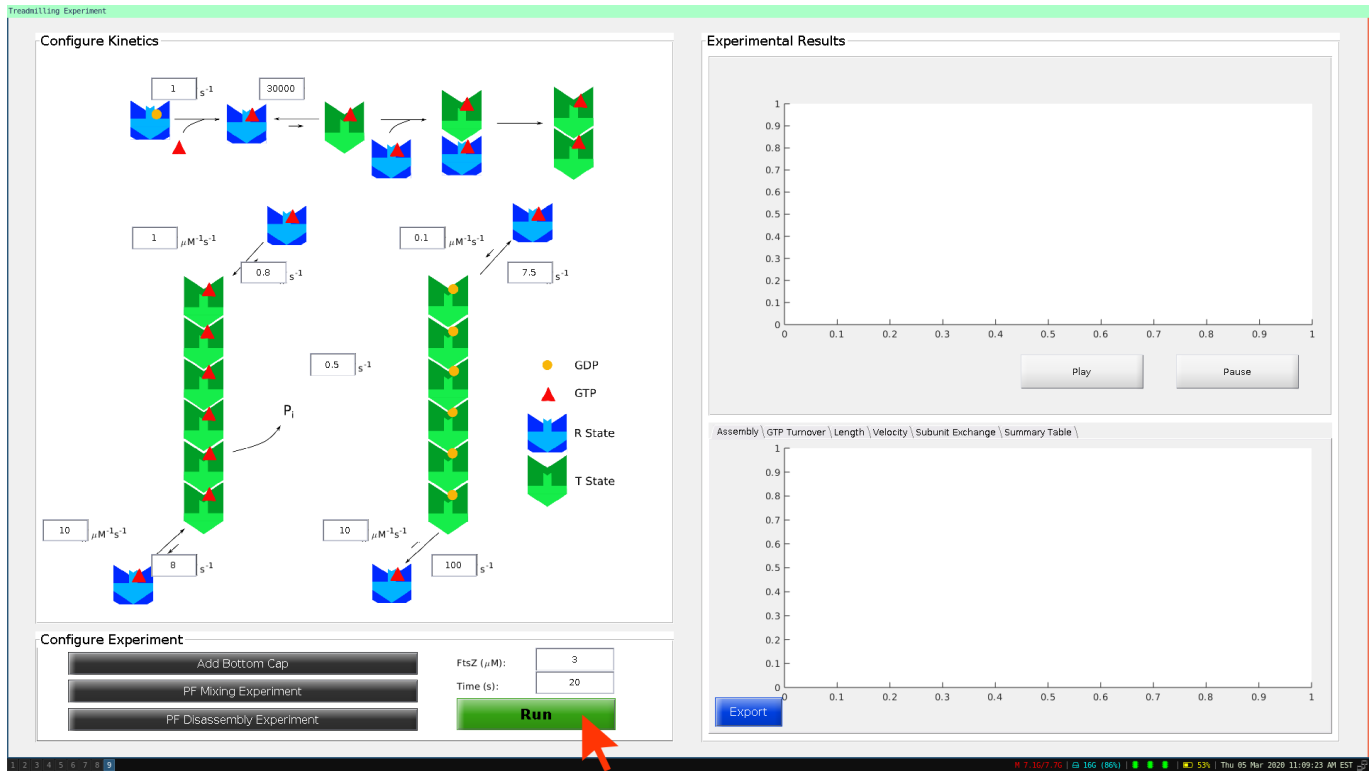


4. Run app by typing **RunApp** in command window and press **Enter** on the keyboard.



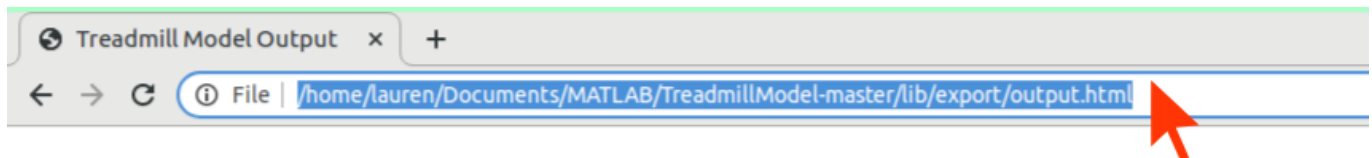
Navigating App Input

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. This will save the file `output####.html` (#### is an identification number) in the `lib/export/` folder, path indicated on the screen. This can be opened in a browser. To save this file, copy and paste the file name into your web browser. Save or print it here.

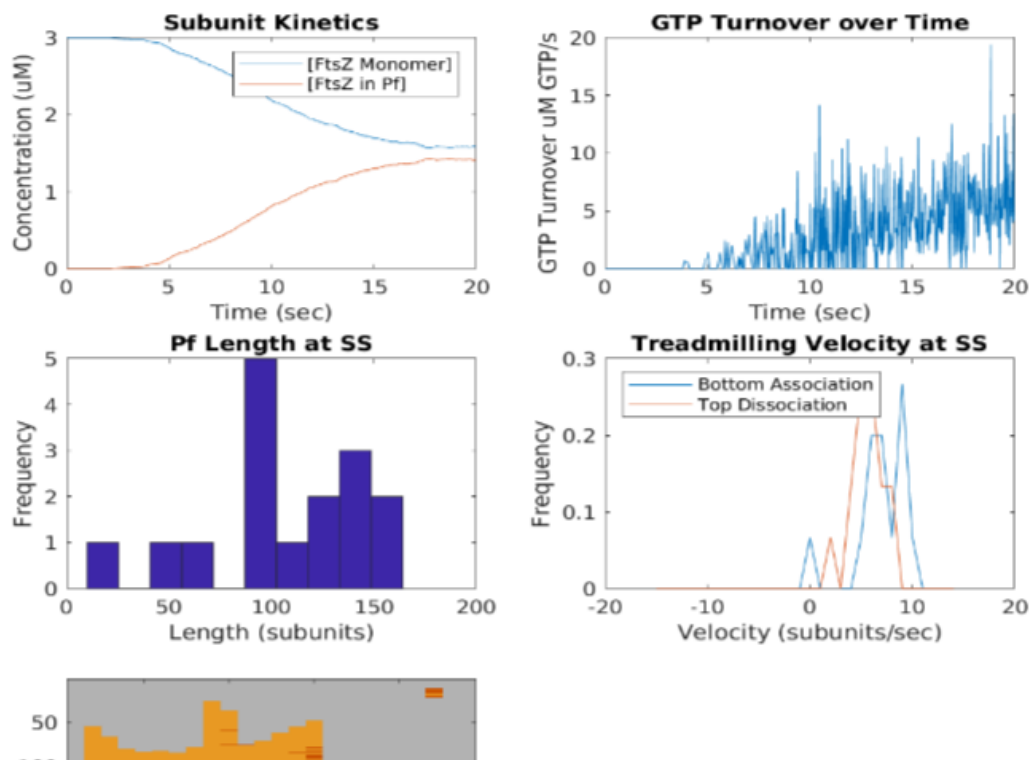


FtsZ Treadmilling Model

Parameters	
Time	20
[FtsZ]	3
FRET Experiment?	no
[Cap]	0
Kinetics	
GDP Exchange	1
GTP Hydrolysis	0.5
Affinity Switch	30000

Kinetics		
Penultimate Subunit	GDP	GTP
Top On	0.1	1
Top Off	7.5	0.8
Bottom Subunit	GDP	GTP
Bottom On	10	10
Bottom Off	100	8

Results at Steady State	
[Monomer]	1.5834
Hydrolysis	4.2628
PF Length	106.8125
Treadmill Velocity	6.7838
Proportion GTP in PF	14.3944



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.