



BPL_TEST2_Chemostat script with PyFMI ver 2.10

The key library PyFMI v2.10 is installed.

After the installation a small application BPL_TEST2_Chemostat is loaded and run. You can continue with this example if you like.

```
In [ ]: !lsb_release -a # Actual VM Ubuntu version used by Google
```

```
No LSB modules are available.  
Distributor ID: Ubuntu  
Description:   Ubuntu 18.04.5 LTS  
Release:      18.04  
Codename:     bionic
```

```
In [ ]: %env PYTHONPATH=
```

```
env: PYTHONPATH=
```

```
In [ ]: !wget https://repo.anaconda.com/miniconda/Miniconda3-py38_22.11.1-Linux-x86_64.sh  
!chmod +x Miniconda3-py38_22.11.1-Linux-x86_64.sh  
!bash ./Miniconda3-py38_22.11.1-Linux-x86_64.sh -b -f -p /usr/local  
import sys  
sys.path.append('/usr/local/lib/python3.7/site-packages/')
```

```
--2022-05-30 12:17:48-- https://repo.anaconda.com/miniconda/Miniconda3-
py37_4.12.0-Linux-x86_64.sh
Resolving repo.anaconda.com (repo.anaconda.com)... 104.16.131.3, 104.16.
130.3, 2606:4700::6810:8203, ...
Connecting to repo.anaconda.com (repo.anaconda.com)|104.16.131.3|:443...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 104996770 (100M) [application/x-sh]
Saving to: 'Miniconda3-py37_4.12.0-Linux-x86_64.sh'
```

```
Miniconda3-py37_4.1 100%[=====>] 100.13M 105MB/s in
1.0s
```

```
2022-05-30 12:17:49 (105 MB/s) - 'Miniconda3-py37_4.12.0-Linux-x86_64.s
h' saved [104996770/104996770]
```

```
PREFIX=/usr/local
Unpacking payload ...
Collecting package metadata (current_repodata.json): - \ done
Solving environment: / - \ done
```

```
## Package Plan ##
```

```
environment location: /usr/local
```

```
added / updated specs:
```

```
- _libgcc_mutex==0.1=main
- _openmp_mutex==4.5=1_gnu
- brotlipy==0.7.0=py37h27cfd23_1003
- ca-certificates==2022.3.29=h06a4308_1
- certifi==2021.10.8=py37h06a4308_2
- cffi==1.15.0=py37hd667e15_1
- charset-normalizer==2.0.4=pyhd3eb1b0_0
- colorama==0.4.4=pyhd3eb1b0_0
- conda-content-trust==0.1.1=pyhd3eb1b0_0
- conda-package-handling==1.8.1=py37h7f8727e_0
- conda==4.12.0=py37h06a4308_0
- cryptography==36.0.0=py37h9ce1e76_0
- idna==3.3=pyhd3eb1b0_0
- ld_impl_linux-64==2.35.1=h7274673_9
- libffi==3.3=he6710b0_2
- libgcc-ng==9.3.0=h5101ec6_17
- libgomp==9.3.0=h5101ec6_17
- libstdcxx-ng==9.3.0=hd4cf53a_17
- ncurses==6.3=h7f8727e_2
- openssl==1.1.1n=h7f8727e_0
- pip==21.2.2=py37h06a4308_0
- pycosat==0.6.3=py37h27cfd23_0
- pycparser==2.21=pyhd3eb1b0_0
- pyopenssl==22.0.0=pyhd3eb1b0_0
- pysocks==1.7.1=py37_1
- python==3.7.13=h12debd9_0
- readline==8.1.2=h7f8727e_1
- requests==2.27.1=pyhd3eb1b0_0
- ruamel_yaml==0.15.100=py37h27cfd23_0
- setuptools==61.2.0=py37h06a4308_0
- six==1.16.0=pyhd3eb1b0_1
- sqlite==3.38.2=hc218d9a_0
- tk==8.6.11=h1ccaba5_0
- tqdm==4.63.0=pyhd3eb1b0_0
```

- urllib3==1.26.8=pyhd3eb1b0_0
- wheel==0.37.1=pyhd3eb1b0_0
- xz==5.2.5=h7b6447c_0
- yaml==0.2.5=h7b6447c_0
- zlib==1.2.12=h7f8727e_1

The following NEW packages will be INSTALLED:

_libgcc_mutex	pkgs/main/linux-64::_libgcc_mutex-0.1-main
_openmp_mutex	pkgs/main/linux-64::_openmp_mutex-4.5-1_gnu
brotlipy	pkgs/main/linux-64::brotlipy-0.7.0-py37h27cfd23_100
3	
ca-certificates	pkgs/main/linux-64::ca-certificates-2022.3.29-h06a4
308_1	
certifi	pkgs/main/linux-64::certifi-2021.10.8-py37h06a4308_
2	
cffi	pkgs/main/linux-64::cffi-1.15.0-py37hd667e15_1
charset-normalizer	pkgs/main/noarch::charset-normalizer-2.0.4-pyhd3eb1
b0_0	
colorama	pkgs/main/noarch::colorama-0.4.4-pyhd3eb1b0_0
conda	pkgs/main/linux-64::conda-4.12.0-py37h06a4308_0
conda-content-tru~	pkgs/main/noarch::conda-content-trust-0.1.1-pyhd3eb
1b0_0	
conda-package-han~	pkgs/main/linux-64::conda-package-handling-1.8.1-py
37h7f8727e_0	
cryptography	pkgs/main/linux-64::cryptography-36.0.0-py37h9ce1e7
6_0	
idna	pkgs/main/noarch::idna-3.3-pyhd3eb1b0_0
ld_impl_linux-64	pkgs/main/linux-64::ld_impl_linux-64-2.35.1-h727467
3_9	
libffi	pkgs/main/linux-64::libffi-3.3-he6710b0_2
libgcc-ng	pkgs/main/linux-64::libgcc-ng-9.3.0-h5101ec6_17
libgomp	pkgs/main/linux-64::libgomp-9.3.0-h5101ec6_17
libstdcxx-ng	pkgs/main/linux-64::libstdcxx-ng-9.3.0-hd4cf53a_17
ncurses	pkgs/main/linux-64::ncurses-6.3-h7f8727e_2
openssl	pkgs/main/linux-64::openssl-1.1.1n-h7f8727e_0
pip	pkgs/main/linux-64::pip-21.2.2-py37h06a4308_0
pycosat	pkgs/main/linux-64::pycosat-0.6.3-py37h27cfd23_0
pycparser	pkgs/main/noarch::pycparser-2.21-pyhd3eb1b0_0
pyopenssl	pkgs/main/noarch::pyopenssl-22.0.0-pyhd3eb1b0_0
pysocks	pkgs/main/linux-64::pysocks-1.7.1-py37_1
python	pkgs/main/linux-64::python-3.7.13-h12debd9_0
readline	pkgs/main/linux-64::readline-8.1.2-h7f8727e_1
requests	pkgs/main/noarch::requests-2.27.1-pyhd3eb1b0_0
ruamel_yaml	pkgs/main/linux-64::ruamel_yaml-0.15.100-py37h27cfd
23_0	
setuptools	pkgs/main/linux-64::setuptools-61.2.0-py37h06a4308_
0	
six	pkgs/main/noarch::six-1.16.0-pyhd3eb1b0_1
sqlite	pkgs/main/linux-64::sqlite-3.38.2-hc218d9a_0
tk	pkgs/main/linux-64::tk-8.6.11-h1ccaba5_0
tqdm	pkgs/main/noarch::tqdm-4.63.0-pyhd3eb1b0_0
urllib3	pkgs/main/noarch::urllib3-1.26.8-pyhd3eb1b0_0
wheel	pkgs/main/noarch::wheel-0.37.1-pyhd3eb1b0_0
xz	pkgs/main/linux-64::xz-5.2.5-h7b6447c_0
yaml	pkgs/main/linux-64::yaml-0.2.5-h7b6447c_0
zlib	pkgs/main/linux-64::zlib-1.2.12-h7f8727e_1

```
Preparing transaction: / - \ done
Executing transaction: / - \ | / - \ | / - \ | /
- \ | done
installation finished.
```

```
In [ ]: !conda update -n base -c defaults conda --yes
```

```
Collecting package metadata (current_repodata.json): - \ | / -
\ | / - \ | / - \ | / - \ | / - done
Solving environment: | / - \ | / - \ done
```

Package Plan

environment location: /usr/local

added / updated specs:
- conda

The following packages will be downloaded:

package	build	
-----	-----	
_openmp_mutex-5.1	1_gnu	21 KB
ca-certificates-2022.4.26	h06a4308_0	124 KB
certifi-2022.5.18.1	py37h06a4308_0	147 KB
conda-4.13.0	py37h06a4308_0	890 KB
cryptography-37.0.1	py37h9ce1e76_0	1.3 MB
ld_impl_linux-64-2.38	h1181459_1	654 KB
libgcc-ng-11.2.0	h1234567_0	5.3 MB
libgomp-11.2.0	h1234567_0	473 KB
libstdcxx-ng-11.2.0	h1234567_0	4.7 MB
openssl-1.1.1o	h7f8727e_0	2.5 MB
sqlite-3.38.3	hc218d9a_0	1.0 MB
tk-8.6.11	h1ccaba5_1	3.0 MB
tqdm-4.64.0	py37h06a4308_0	126 KB
urllib3-1.26.9	py37h06a4308_0	180 KB
xz-5.2.5	h7f8727e_1	339 KB
zlib-1.2.12	h7f8727e_2	106 KB
-----	-----	
	Total:	20.8 MB

The following packages will be REMOVED:

colorama-0.4.4-pyhd3eb1b0_0
conda-content-trust-0.1.1-pyhd3eb1b0_0
six-1.16.0-pyhd3eb1b0_1

The following packages will be UPDATED:

_openmp_mutex	4.5-1_gnu --> 5.1-1_gn
u	
ca-certificates	2022.3.29-h06a4308_1 --> 2022.4.2
6-h06a4308_0	
certifi	2021.10.8-py37h06a4308_2 --> 2022.5.1
8.1-py37h06a4308_0	
conda	4.12.0-py37h06a4308_0 --> 4.13.0-p
y37h06a4308_0	
cryptography	36.0.0-py37h9ce1e76_0 --> 37.0.1-p
y37h9ce1e76_0	
ld_impl_linux-64	2.35.1-h7274673_9 --> 2.38-h11
81459_1	
libgcc-ng	9.3.0-h5101ec6_17 --> 11.2.0-h
1234567_0	
libgomp	9.3.0-h5101ec6_17 --> 11.2.0-h
1234567_0	
libstdcxx-ng	9.3.0-hd4cf53a_17 --> 11.2.0-h

```

1234567_0
  openssl                                1.1.1n-h7f8727e_0 --> 1.1.1o-h
7f8727e_0
  sqlite                                3.38.2-hc218d9a_0 --> 3.38.3-h
c218d9a_0
  tk                                    8.6.11-h1ccaba5_0 --> 8.6.11-h
lccaba5_1
  tqdm                                pkgs/main/noarch::tqdm-4.63.0-pyhd3eb~ --> pkgs/mai
n/linux-64::tqdm-4.64.0-py37h06a4308_0
  urllib3                             pkgs/main/noarch::urllib3-1.26.8-pyhd~ --> pkgs/mai
n/linux-64::urllib3-1.26.9-py37h06a4308_0
  xz                                    5.2.5-h7b6447c_0 --> 5.2.5-h7
f8727e_1
  zlib                                1.2.12-h7f8727e_1 --> 1.2.12-h
7f8727e_2

```

Downloading and Extracting Packages

```

tk-8.6.11           | 3.0 MB      | : 100% 1.0/1 [00:00<00:00, 3.32it/s]
ld_impl_linux-64-2.3 | 654 KB     | : 100% 1.0/1 [00:00<00:00, 11.80it/s]
_openmp_mutex-5.1   | 21 KB      | : 100% 1.0/1 [00:00<00:00, 16.20it/s]
libgomp-11.2.0      | 473 KB     | : 100% 1.0/1 [00:00<00:00, 13.78it/s]
libstdcxx-ng-11.2.0 | 4.7 MB     | : 100% 1.0/1 [00:00<00:00, 5.15it/s]
openssl-1.1.1o      | 2.5 MB     | : 100% 1.0/1 [00:00<00:00, 7.74it/s]
xz-5.2.5            | 339 KB     | : 100% 1.0/1 [00:00<00:00, 14.16it/s]
sqlite-3.38.3       | 1.0 MB     | : 100% 1.0/1 [00:00<00:00, 11.58it/s]
tqdm-4.64.0         | 126 KB     | : 100% 1.0/1 [00:00<00:00, 14.26it/s]
certifi-2022.5.18.1 | 147 KB     | : 100% 1.0/1 [00:00<00:00, 12.55it/s]
conda-4.13.0        | 890 KB     | : 100% 1.0/1 [00:00<00:00, 8.43it/s]
libgcc-ng-11.2.0    | 5.3 MB     | : 100% 1.0/1 [00:00<00:00, 3.71it/s]
cryptography-37.0.1 | 1.3 MB     | : 100% 1.0/1 [00:00<00:00, 5.80it/s]
urllib3-1.26.9      | 180 KB     | : 100% 1.0/1 [00:00<00:00, 13.30it/s]
zlib-1.2.12         | 106 KB     | : 100% 1.0/1 [00:00<00:00, 17.91it/s]
ca-certificates-2022 | 124 KB     | : 100% 1.0/1 [00:00<00:00, 18.12it/s]
Preparing transaction: / done
Verifying transaction: \ | / done
Executing transaction: \ | / - done

```

```
In [ ]: !conda --version
        !python --version
```

```
conda 4.13.0
Python 3.7.13
```

```
In [ ]: !conda install -c conda-forge pyfmi --yes # Install the key package
```

```
Solving environment: \ failed with initial frozen solve. Retrying with
flexible solve.
```

Solving environment:	-	\		/	-	\		/	-	\		/	-	\		/	-
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```

/ - \ | / - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
done

```

Package Plan

environment location: /usr/local

added / updated specs:
- pyfmi==2.7.4

The following packages will be downloaded:

package	build		
-----	-----		
assimulo-3.2.9	py37h7fe24a9_0	2.6 MB	conda-
forge			
ca-certificates-2022.5.18.1	ha878542_0	144 KB	conda-
forge			
certifi-2022.5.18.1	py37h89c1867_0	150 KB	conda-
forge			
fmilib-2.2.3	he1b5a44_0	532 KB	conda-
forge			
gmp-6.2.1	h58526e2_0	806 KB	conda-
forge			
icu-68.2	h9c3ff4c_0	13.1 MB	conda-
forge			
libblas-3.9.0	14_linux64_openblas	12 KB	cond
a-forge			
libcblas-3.9.0	14_linux64_openblas	12 KB	cond
a-forge			
libgfortran-ng-12.1.0	h69a702a_16	23 KB	conda-
forge			
libgfortran5-12.1.0	hdcd56e2_16	1.8 MB	conda-
forge			
libiconv-1.16	h516909a_0	1.4 MB	conda-
forge			
liblapack-3.9.0	14_linux64_openblas	12 KB	cond
a-forge			
libopenblas-0.3.20	pthread_h78a6416_0	10.1 MB	cond
a-forge			
libxml2-2.9.12	h72842e0_0	772 KB	conda-
forge			
libxslt-1.1.33	h15afd5d_2	522 KB	conda-
forge			
lxml-4.8.0	py37h540881e_2	1.4 MB	conda-
forge			
metis-5.1.0	h58526e2_1006	4.1 MB	conda-
forge			
mpfr-4.1.0	h9202a9a_1	2.6 MB	conda-
forge			
numpy-1.21.6	py37h976b520_0	6.1 MB	conda-
forge			
openssl-1.1.1o	h166bdaf_0	2.1 MB	conda-
forge			
pyfmi-2.7.4	py37h161383b_0	12.4 MB	conda-
forge			
python_abi-3.7	2_cp37m	4 KB	conda-
forge			

scipy-1.7.3		py37hf2a6cf1_0	21.8 MB	conda-
forge				
suitesparse-5.10.1		h9e50725_1	2.4 MB	conda-
forge				
sundials-5.8.0		h558c624_0	1.0 MB	conda-
forge				
tbb-2021.5.0		h924138e_1	1.9 MB	conda-
forge				

Total:			87.5 MB	

The following NEW packages will be INSTALLED:

assimulo	conda-forge/linux-64::assimulo-3.2.9-py37h7fe24a9_0
fmilib	conda-forge/linux-64::fmilib-2.2.3-he1b5a44_0
gmp	conda-forge/linux-64::gmp-6.2.1-h58526e2_0
icu	conda-forge/linux-64::icu-68.2-h9c3ff4c_0
libblas	conda-forge/linux-64::libblas-3.9.0-14_linux64_open
blas	
libcbblas	conda-forge/linux-64::libcbblas-3.9.0-14_linux64_ope
nblas	
libgfortran-ng	conda-forge/linux-64::libgfortran-ng-12.1.0-h69a702
a_16	
libgfortran5	conda-forge/linux-64::libgfortran5-12.1.0-hdcd56e2_
16	
libiconv	conda-forge/linux-64::libiconv-1.16-h516909a_0
liblapack	conda-forge/linux-64::liblapack-3.9.0-14_linux64_op
enblas	
libopenblas	conda-forge/linux-64::libopenblas-0.3.20-pthreads_h
78a6416_0	
libxml2	conda-forge/linux-64::libxml2-2.9.12-h72842e0_0
libxslt	conda-forge/linux-64::libxslt-1.1.33-h15afd5d_2
lxml	conda-forge/linux-64::lxml-4.8.0-py37h540881e_2
metis	conda-forge/linux-64::metis-5.1.0-h58526e2_1006
mpfr	conda-forge/linux-64::mpfr-4.1.0-h9202a9a_1
numpy	conda-forge/linux-64::numpy-1.21.6-py37h976b520_0
pyfmi	conda-forge/linux-64::pyfmi-2.7.4-py37h161383b_0
python_abi	conda-forge/linux-64::python_abi-3.7-2_cp37m
scipy	conda-forge/linux-64::scipy-1.7.3-py37hf2a6cf1_0
suitesparse	conda-forge/linux-64::suitesparse-5.10.1-h9e50725_1
sundials	conda-forge/linux-64::sundials-5.8.0-h558c624_0
tbb	conda-forge/linux-64::tbb-2021.5.0-h924138e_1

The following packages will be UPDATED:

ca-certificates	pkgs/main::ca-certificates-2022.4.26~ --> conda-fo
rge::ca-certificates-2022.5.18.1-ha878542_0	

The following packages will be SUPERSEDED by a higher-priority channel:

certifi	pkgs/main::certifi-2022.5.18.1-py37h0~ --> conda-fo
rge::certifi-2022.5.18.1-py37h89c1867_0	
openssl	pkgs/main::openssl-1.1.1o-h7f8727e_0 --> conda-fo
rge::openssl-1.1.1o-h166bdaf_0	

Downloading and Extracting Packages

libcbblas-3.9.0	12 KB	: 100% 1.0/1 [00:00<00:00, 8.57it/s]
metis-5.1.0	4.1 MB	: 100% 1.0/1 [00:00<00:00, 1.16it/s]

```

suitesparse-5.10.1 | 2.4 MB | : 100% 1.0/1 [00:00<00:00, 2.07it/s]
libxml2-2.9.12 | 772 KB | : 100% 1.0/1 [00:00<00:00, 5.69it/s]
libiconv-1.16 | 1.4 MB | : 100% 1.0/1 [00:00<00:00, 4.26it/s]
liblapack-3.9.0 | 12 KB | : 100% 1.0/1 [00:00<00:00, 20.37it/s]
fmllib-2.2.3 | 532 KB | : 100% 1.0/1 [00:00<00:00, 1.73it/s]
tbb-2021.5.0 | 1.9 MB | : 100% 1.0/1 [00:00<00:00, 2.94it/s]
certifi-2022.5.18.1 | 150 KB | : 100% 1.0/1 [00:00<00:00, 14.86it/s]
libgfortran-ng-12.1. | 23 KB | : 100% 1.0/1 [00:00<00:00, 21.56it/s]
assimulo-3.2.9 | 2.6 MB | : 100% 1.0/1 [00:00<00:00, 1.57it/s]
gmp-6.2.1 | 806 KB | : 100% 1.0/1 [00:00<00:00, 5.40it/s]
pyfmi-2.7.4 | 12.4 MB | : 100% 1.0/1 [00:03<00:00, 3.05s/it]
libopenblas-0.3.20 | 10.1 MB | : 100% 1.0/1 [00:01<00:00, 1.92s/it]
openssl-1.1.1o | 2.1 MB | : 100% 1.0/1 [00:00<00:00, 2.47it/s]
libblas-3.9.0 | 12 KB | : 100% 1.0/1 [00:00<00:00, 22.98it/s]
numpy-1.21.6 | 6.1 MB | : 100% 1.0/1 [00:01<00:00, 1.35s/it]
icu-68.2 | 13.1 MB | : 100% 1.0/1 [00:02<00:00, 2.13s/it]
lxml-4.8.0 | 1.4 MB | : 100% 1.0/1 [00:00<00:00, 3.37it/s]
libgfortran5-12.1.0 | 1.8 MB | : 100% 1.0/1 [00:00<00:00, 2.38it/s]
python_abi-3.7 | 4 KB | : 100% 1.0/1 [00:00<00:00, 20.01it/s]
libxslt-1.1.33 | 522 KB | : 100% 1.0/1 [00:00<00:00, 5.67it/s]
sundials-5.8.0 | 1.0 MB | : 100% 1.0/1 [00:00<00:00, 2.43it/s]
scipy-1.7.3 | 21.8 MB | : 100% 1.0/1 [00:03<00:00, 3.87s/it]
ca-certificates-2022 | 144 KB | : 100% 1.0/1 [00:00<00:00, 16.26it/s]
mpfr-4.1.0 | 2.6 MB | : 100% 1.0/1 [00:00<00:00, 2.13it/s]
Preparing transaction: - \ done
Verifying transaction: / - \ | / - done
Executing transaction: | / - \ | / - \ done

```

```
In [ ]: !conda install numpy=1.19.1 --yes # Need to downgrade numpy
```

```

Collecting package metadata (current_repodata.json): - \ | / -
\ | done
Solving environment: - failed with initial frozen solve. Retrying with
flexible solve.
Collecting package metadata (repodata.json): | / - \ | / -
\ | / - \ | / - \ done
Solving environment: / - \ | / - \ | / - \ | /
- \ | / - \ | / - \ | / - \ | /
| / - \ | / - \ | / - \ | /
- \ | / - \ | / - \ | / - \
| / - \ | / - \ done

```

Package Plan

environment location: /usr/local

added / updated specs:
- numpy=1.19.1

The following packages will be downloaded:

package	build	
blas-1.0	openblas	46 KB
numpy-1.19.1	py37h30dfecb_0	21 KB
numpy-base-1.19.1	py37h75fe3a5_0	4.1 MB
Total:		4.2 MB

The following NEW packages will be INSTALLED:

blas	pkgs/main/linux-64::blas-1.0-openblas
numpy-base	pkgs/main/linux-64::numpy-base-1.19.1-py37h75fe3a5_0

The following packages will be SUPERSEDED by a higher-priority channel:

ca-certificates	conda-forge::ca-certificates-2022.5.1~ --> pkgs/main::ca-certificates-2022.4.26-h06a4308_0
certifi	conda-forge::certifi-2022.5.18.1-py37~ --> pkgs/main::certifi-2022.5.18.1-py37h06a4308_0
numpy	conda-forge::numpy-1.21.6-py37h976b52~ --> pkgs/main::numpy-1.19.1-py37h30dfecb_0
openssl	conda-forge::openssl-1.1.1o-h166bdaf_0 --> pkgs/main::openssl-1.1.1o-h7f8727e_0

Downloading and Extracting Packages

```

blas-1.0          | 46 KB      | : 100% 1.0/1 [00:00<00:00, 8.39it/s]
numpy-base-1.19.1 | 4.1 MB     | : 100% 1.0/1 [00:02<00:00, 2.23s/it]
numpy-1.19.1      | 21 KB      | : 100% 1.0/1 [00:00<00:00, 4.59it/s]
Preparing transaction: / done
Verifying transaction: \ | done
Executing transaction: - \ | done

```

Now specific installation run a simulation and notebook for that

Start with connecting to Github. Then upload the two files:

- FMU - BPL_TEST2_Chemostat_linux_om_me.fmu
- Setup-file - BPL_TEST2_Chemostat_explore.py

```
In [ ]: # Filter out DeprecationWarnings for 'np.float as alias' is needed - wish
import warnings
warnings.filterwarnings("ignore")
```

```
In [ ]: %%bash
git clone https://github.com/janpeter19/BPL_TEST2_Chemostat
```

Cloning into 'BPL_TEST2_Chemostat'...

```
In [ ]: %cd BPL_TEST2_Chemostat

/content/BPL_TEST2_Chemostat/BPL_TEST2_Chemostat/BPL_TEST2_Chemostat/BPL_TEST2_Chemostat
```

```
In [1]: run -i BPL_TEST2_Chemostat_explore.py
```

Linux - run FMU pre-compiled OpenModelica 1.21.0

Model for bioreactor has been setup. Key commands:

- par()	- change of parameters and initial values
- init()	- change initial values only
- simu()	- simulate and plot
- newplot()	- make a new plot
- show()	- show plot from previous simulation
- disp()	- display parameters and initial values from the last simulation
- describe()	- describe culture, broth, parameters, variables with values/units

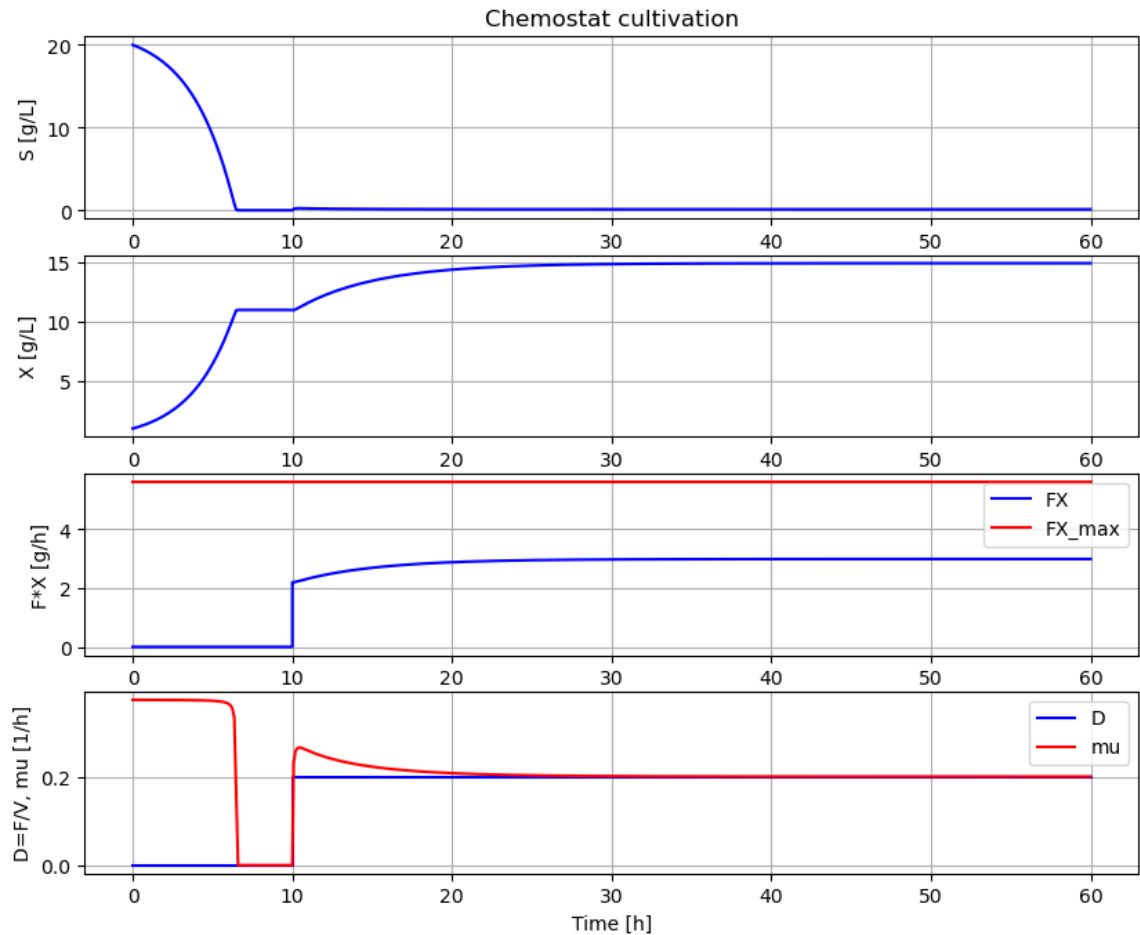
Note that both disp() and describe() takes values from the last simulation

Brief information about a command by help(), eg help(simu)

Key system information is listed with the command system_info()

```
In [2]: %matplotlib inline
plt.rcParams['figure.figsize'] = [25/2.54, 20/2.54]
```

```
In [3]: newplot()
par(Y=0.50, qSmax=0.75, Ks=0.1)           # Culture parameters
init(V_0=1.0, VX_0=1.0, VS_0=20)         # Bioreactor startup
par(S_in=30, t0=0, F0=0, t1=10, F1=0.2)   # Substrate feeding
simu(60)
```



```
In [4]: # The maximal biomass productivity FX_max [g/h] marked red in the diagram
# can be calculated for CSTR from the FMU and is
cstrProdMax(model)
```

```
Out[4]: 5.625
```

```
In [5]: describe('cstrProdMax')
```

Calculate from the model maximal chemostat productivity FX_{max} : 5.625 [g/h]

```
In [6]: describe('parts')
```

['bioreactor', 'bioreactor.culture', 'D', 'dosagescheme', 'feedtank', 'harvesttank']

```
In [7]: system_info()
```

System information

- OS: Linux
- Python: 3.8.16
- Scipy: not installed in the notebook
- PyFMI: 2.9.8
- FMU by: OpenModelica Compiler OpenModelica 1.21.0~dev-185-g9d983b8
- FMI: 2.0
- Type: FMUModelME2
- Name: BPL_TEST2.Chemostat
- Generated: 2023-02-13T10:27:14Z
- MSL: 3.2.3
- Description: Bioprocess Library version 2.1.1-beta
- Interaction: FMU-explore version 0.9.6

In []: