



BPL_TEST2_Fedbatch script with PyFMI ver 2.9.8

The key library PyFMI ver 2.9.8 is installed.

After the installation a small application BPL_CHO_Fedbatch 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 20.04.5 LTS  
Release:        20.04  
Codename:       focal
```

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

```
env: PYTHONPATH=
```

```
In [ ]: !wget https://repo.anaconda.com/miniconda/Miniconda3-py38_22.11.1-1-Linux  
!chmod +x Miniconda3-py38_22.11.1-1-Linux-x86_64.sh  
!bash ./Miniconda3-py38_22.11.1-1-Linux-x86_64.sh -b -f -p /usr/local  
import sys  
sys.path.append('/usr/local/lib/python3.8/site-packages/')
```

```
--2023-01-21 09:07:33-- https://repo.anaconda.com/miniconda/Miniconda3-  
py38_22.11.1-1-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: 64630241 (62M) [application/x-sh]  
Saving to: 'Miniconda3-py38_22.11.1-1-Linux-x86_64.sh'
```

```
Miniconda3-py38_22. 100%[=====>] 61.64M 138MB/s in  
0.4s
```

```
2023-01-21 09:07:33 (138 MB/s) - 'Miniconda3-py38_22.11.1-1-Linux-x86_6  
4.sh' saved [64630241/64630241]
```

```
PREFIX=/usr/local  
Unpacking payload ...
```

```
Installing base environment...
```

```
Downloading and Extracting Packages
```

```
Downloading and Extracting Packages
```

```
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: \ | / - \ | / - \ | / - \
 | / - \ |

The environment is inconsistent, please check the package plan carefully
 The following packages are causing the inconsistency:

- conda-forge/linux-64::tbb==2021.7.0=h924138e_1
- conda-forge/linux-64::numpy==1.24.1=py38hab0fcb9_0
- conda-forge/linux-64::suitesparse==5.10.1=h9e50725_1
- conda-forge/linux-64::scipy==1.10.0=py38h10c12cc_0
- conda-forge/linux-64::libcbblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libopenblas==0.3.21=threads_h78a6416_3
- conda-forge/linux-64::pyfmi==2.9.8=py38h26c90d9_1
- conda-forge/linux-64::assimulo==3.3=py38h71f17ff_1
- conda-forge/linux-64::libblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::liblapack==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libhwloc==2.8.0=h32351e8_1
- conda-forge/linux-64::fmilib==2.4.1=h27087fc_0
- conda-forge/linux-64::sundials==6.4.1=h89a52a3_0

/ - \ | / - \ | / - \ | / - \ | failed
 with repodata from current_repodata.json, will retry with next repodata
 source.

Solving environment: - \ | / - \ | / - \ | / - \ | / -
 \ | / - \ | / - \ | / - \ | / - \ | failed
 with repodata from current_repodata.json, will retry with next repodata
 source.

Collecting package metadata (repodata.json): | / - \ | / -
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Solving environment: - \ | / - \ | / - \ | / -
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- conda-forge/linux-64::tbb==2021.7.0=h924138e_1
- conda-forge/linux-64::numpy==1.24.1=py38hab0fcb9_0
- conda-forge/linux-64::suitesparse==5.10.1=h9e50725_1
- conda-forge/linux-64::scipy==1.10.0=py38h10c12cc_0
- conda-forge/linux-64::libcbblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libopenblas==0.3.21=threads_h78a6416_3
- conda-forge/linux-64::pyfmi==2.9.8=py38h26c90d9_1
- conda-forge/linux-64::assimulo==3.3=py38h71f17ff_1
- conda-forge/linux-64::libblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::liblapack==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libhwloc==2.8.0=h32351e8_1
- conda-forge/linux-64::fmilib==2.4.1=h27087fc_0
- conda-forge/linux-64::sundials==6.4.1=h89a52a3_0

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```

Found conflicts! Looking for incompatible packages.
This can take several minutes. Press CTRL-C to abort.
/ failed

UnsatisfiableError: The following specifications were found to be incompatible with the existing python installation in your environment:

Specifications:

```

- conda-content-trust -> python[version='>=2.7,<2.8.0a0']>=3.6,<3.7.0a0
|>=3.5,<3.6.0a0']
- wheel -> python[version='>=3.10,<3.11.0a0']>=3.9,<3.10.0a0']>=3.11,<3.
12.0a0']

```

Your python: python=3.8

If python is on the left-most side of the chain, that's the version you've asked for.
When python appears to the right, that indicates that the thing on the left is somehow not available for the python version you are constrained to. Note that conda will not change your python version to a different minor version unless you explicitly specify that.

The following specifications were found to be incompatible with a past explicit spec that is not an explicit spec in this operation (setuptools):

```

- conda -> conda[version='>=22.11.1']
- conda -> python[version='>=3.9,<3.10.0a0'] -> pip
- conda -> ruamel.yaml[version='>=0.11.14,<0.18'] -> setuptools
- conda -> setuptools[version='>=31.0.1']

```

The following specifications were found to be incompatible with each other:

Output in format: Requested package -> Available versions

Package libgcc-ng conflicts for:

```

setuptools -> python[version='>=3.10,<3.11.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
libopenblas -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=8.2.0|>=7.2.0|>=12']
conda-content-trust -> cryptography -> libgcc-ng[version='>=11.2.0|>=7.2.0|>=7.3.0|>=7.5.0']
assimulo -> libgcc-ng[version='>=12']
certifi -> python[version='>=3.9,<3.10.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
wheel -> python -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
openssl -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0'] -> libgcc-ng[version='>=11.2.0|>=12']
sundials -> libgcc-ng[version='>=12']
numpy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgcc-ng[version='>=8.2.0']
suitesparse -> tbb[version='>=2020.3'] -> libgcc-ng[version='>=12']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
pip -> python[version='>=3.8,<3.9.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
numpy -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
tbb -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
python=3.8 -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0']
fmlib -> libgcc-ng[version='>=12']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=9.4.0']
scipy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgcc-ng[version='>=8.2.0']
libhwloc -> libgcc-ng[version='>=12']
scipy -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
conda -> conda-package-handling[version='>=1.3.0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
libhwloc -> libxml2[version='>=2.9.14,<2.11.0a0'] -> libgcc-ng[version='>=7.5.0']
pyfmi -> lxml -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
conda[version='>=22.11.1'] -> conda-package-handling[version='>=1.3.0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
python=3.8 -> zlib[version='>=1.2.11,<1.3.0a0'] -> libgcc-ng[version='>=7.2.0']
suitesparse -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=9.4.0']
pyfmi -> libgcc-ng[version='>=12']

```

Package pip conflicts for:

```

conda-content-trust -> python[version='>=3.7,<3.8.0a0'] -> pip
assimulo -> python[version='>=3.8,<3.9.0a0'] -> pip
pyfmi -> python[version='>=3.8,<3.9.0a0'] -> pip
certifi -> python[version='>=3.9,<3.10.0a0'] -> pip
scipy -> python[version='>=3.9,<3.10.0a0'] -> pip
wheel -> python -> pip
conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> pip
python=3.8 -> pip
setuptools -> python[version='>=3.10,<3.11.0a0'] -> pip

```

Package libblas conflicts for:

```

assimulo -> libblas[version='>=3.9.0,<4.0a0']
liblapack -> libblas==3.9.0=16_linux64_openblas
sundials -> libblas[version='>=3.9.0,<4.0a0']
suitesparse -> libblas[version='>=3.8.0,<4.0a0']

```

```

scipy -> libblas[version='>=3.9.0,<4.0a0']
scipy -> libcbblas[version='>=3.9.0,<4.0a0'] -> libblas==3.9.0=16_linux64_openblas
sundials -> liblapack[version='>=3.9.0,<4.0a0'] -> libblas[version='3.9.0|>=3.8.0,<4.0a0',build=16_linux64_openblas]
pyfmi -> assimulo[version='>=3.0'] -> libblas[version='>=3.9.0,<4.0a0']
suitesparse -> libcbblas[version='>=3.8.0,<4.0a0'] -> libblas==3.9.0=16_linux64_openblas
assimulo -> liblapack[version='>=3.9.0,<4.0a0'] -> libblas==3.9.0=16_linux64_openblas
libcbblas -> libblas==3.9.0=16_linux64_openblas

```

Package libgfortran-ng conflicts for:

```

numpy -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
assimulo -> libgfortran-ng
scipy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgfortran-ng[version='>=8,<9.0a0']
pyfmi -> assimulo[version='>=3.0'] -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
suitesparse -> libopenblas[version='>=0.3.20,<1.0a0'] -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
assimulo -> scipy -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
scipy -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
numpy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgfortran-ng[version='>=8,<9.0a0']
libopenblas -> libgfortran-ng[version='>=7,<8.0a0|>=8,<9.0a0|>=7.2.0,<8.0a0']
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0'] -> libgfortran-ng

```

Package enum34 conflicts for:

```

conda -> enum34
conda-content-trust -> cryptography -> enum34

```

Package _libgcc_mutex conflicts for:

```

openssl -> libgcc-ng[version='>=7.5.0'] -> _libgcc_mutex[version='*|0.1',build=main]
numpy -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
python=3.8 -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
suitesparse -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
scipy -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
tbb -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
libopenblas -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]

```

Package requests conflicts for:

```

conda[version='>=22.11.1'] -> requests[version='>=2.20.1,<3']
conda -> requests[version='>=2.12.4|>=2.12.4,<3|>=2.18.4,<3|>=2.20.1,<3|>=2.14.2,<3']
scipy -> pooch -> requests[version='>=2.19.0']

```

Package zlib conflicts for:

```

conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
conda-content-trust -> python[version='>=3.7,<3.8.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']

```

```

assimulo -> python[version='>=3.8,<3.9.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
python=3.8 -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
pyfmi -> python[version='>=3.8,<3.9.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
conda -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
numpy -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
libhwloc -> libxml2[version='>=2.9.14,<2.11.0a0'] -> zlib[version='>=1.2.12,<1.3.0a0']
setuptools -> python[version='>=3.10,<3.11.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
pip -> python[version='>=3.8,<3.9.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
certifi -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
scipy -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
wheel -> python -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']

```

Package libstdcxx-ng conflicts for:

```

sundials -> libstdcxx-ng[version='>=12']
conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
suitesparse -> tbb[version='>=2020.3'] -> libstdcxx-ng[version='>=12']
conda -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
conda-content-trust -> python[version='>=3.7,<3.8.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.2.0|>=7.3.0|>=7.5.0']
python=3.8 -> libffi[version='>=3.2.1,<3.3a0'] -> libstdcxx-ng[version='>=7.2.0']
libopenblas -> libstdcxx-ng[version='>=11.2.0|>=7.5.0']
fmlib -> libstdcxx-ng[version='>=12']
setuptools -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
scipy -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=12|>=7.3.0|>=7.2.0']
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0'] -> libstdcxx-ng[version='>=11.2.0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=9.4.0']
pyfmi -> fmlib[version='>=2.4.1,<2.5.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=12|>=7.5.0|>=7.3.0|>=7.2.0']
libhwloc -> libstdcxx-ng[version='>=12']
pip -> python[version='>=3.8,<3.9.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
tbb -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
certifi -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
wheel -> python -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
numpy -> mkl_fft -> libstdcxx-ng[version='>=7.2.0|>=7.3.0']
python=3.8 -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0']
numpy -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=12']
suitesparse -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=9.4.0']

```

Package libgfortran5 conflicts for:

```
libopenblas -> libgfortran-ng -> libgfortran5[version='11.2.0.*|9.3.0.*|
8.4.0.*|12.2.0',build=h337968e_19]
libopenblas -> libgfortran5[version='>=10.4.0|>=11.2.0']
```

Package libopenblas conflicts for:

```
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
assimulo -> libblas[version='>=3.9.0,<4.0a0'] -> libopenblas[version='>=
0.2.20,<0.2.21.0a0|>=0.3.2,<0.3.3.0a0|>=0.3.20,<1.0a0|>=0.3.21,<0.3.22.0
a0|>=0.3.21,<1.0a0|>=0.3.3,<1.0a0']
suitesparse -> libblas[version='>=3.8.0,<4.0a0'] -> libopenblas[version
='>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0'] -> libopenblas[version='>=0.2.
20,<0.2.21.0a0|>=0.3.2,<0.3.3.0a0|>=0.3.20,<1.0a0|>=0.3.3,<1.0a0|>=0.3.2
1,<1.0a0']
scipy -> libopenblas[version='>=0.2.20,<0.2.21.0a0|>=0.3.2,<0.3.3.0a0|>=
0.3.20,<1.0a0|>=0.3.21,<1.0a0|>=0.3.3,<1.0a0']
scipy -> libblas[version='>=3.9.0,<4.0a0'] -> libopenblas[version='>=0.
3.21,<0.3.22.0a0']
suitesparse -> libopenblas[version='>=0.2.20,<0.2.21.0a0|>=0.3.20,<1.0a0
|>=0.3.3,<1.0a0']
libcblas -> libblas==3.9.0=16_linux64_openblas -> libopenblas[version='>
=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
liblapack -> libblas==3.9.0=16_linux64_openblas -> libopenblas[version
='>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
sundials -> libblas[version='>=3.9.0,<4.0a0'] -> libopenblas[version='>=
0.3.20,<1.0a0|>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0|>=0.3.3,<1.0a0']
```

Package liblapack conflicts for:

```
pyfmi -> assimulo[version='>=3.0'] -> liblapack[version='>=3.9.0,<4.0a
0']
assimulo -> liblapack[version='>=3.9.0,<4.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> liblapack[version
='>=3.8.0,<4.0a0']
sundials -> liblapack[version='>=3.9.0,<4.0a0']
scipy -> liblapack[version='>=3.9.0,<4.0a0']
suitesparse -> liblapack[version='>=3.8.0,<4.0a0']
```

Package intel-openmp conflicts for:

```
suitesparse -> mkl[version='>=2021.4.0,<2022.0a0'] -> intel-openmp=2021
scipy -> mkl[version='>=2021.4.0,<2022.0a0'] -> intel-openmp=2021
pyfmi -> scipy -> intel-openmp[version='>=2021.4.0,<2022.0a0']
scipy -> intel-openmp[version='>=2021.4.0,<2022.0a0']
assimulo -> scipy -> intel-openmp[version='>=2021.4.0,<2022.0a0']
numpy -> mkl[version='>=2021.4.0,<2022.0a0'] -> intel-openmp[version='20
21.*|2022.*']
```

Package openssl conflicts for:

```
scipy -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='1.0.*|>=
1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.
1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<
1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.
2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>
=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
python=3.8 -> openssl[version='>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1
g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<
1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a']
setuptools -> python[version='>=3.10,<3.11.0a0'] -> openssl[version='1.
0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|
```



```

>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']
wheel -> python -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']
pip -> python[version='>=3.8,<3.9.0a0'] -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.0.2l,<1.0.3a']
certifi -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
conda -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
assimulo -> python[version='>=3.8,<3.9.0a0'] -> openssl[version='>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']
conda-content-trust -> cryptography -> openssl[version='1.0.*|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
pyfmi -> python[version='>=3.8,<3.9.0a0'] -> openssl[version='>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']

```

Package libxml2 conflicts for:

```

tbb -> libhwloc[version='>=2.8.0,<2.8.1.0a0'] -> libxml2[version='>=2.9.14,<2.11.0a0']
libhwloc -> libxml2[version='>=2.9.14,<2.11.0a0']
pyfmi -> lxml -> libxml2[version='>=2.9.10,<2.10.0a0|>=2.9.12,<2.10.0a0|>=2.9.14,<2.10.0a0|>=2.9.2,!>=2.9.11,!>=2.9.12|>=2.9.9,<2.10.0a0|>=2.9.8,<2.10.0a0|>=2.9.7,<2.10.0a0|>=2.9.4,<2.10.0a0']

```

Package six conflicts for:

```

numpy -> mkl-service[version='>=2.3.0,<3.0a0'] -> six
conda-content-trust -> cryptography -> six[version='>=1.4.1']

```

```
conda -> conda-package-handling[version='>=1.3.0'] -> six[version='>=1.5.2']
suitesparse -> mkl-service[version='>=2.3.0,<3.0a0'] -> six
conda-content-trust -> six
scipy -> mkl-service[version='>=2.3.0,<3.0a0'] -> six
conda[version='>=22.11.1'] -> conda-package-handling[version='>=1.3.0']
-> six[version='>=1.5.2']
```

Package suitesparse conflicts for:

```
assimulo -> sundials[version='>=6.4.0,<6.5.0a0'] -> suitesparse[version='>=5.10.1,<6.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0']
```

Package scipy conflicts for:

```
pyfmi -> scipy
assimulo -> scipy
```

Package libgfortran4 conflicts for:

```
pyfmi -> scipy -> libgfortran4[version='>=7.5.0']
scipy -> libgfortran4[version='>=7.5.0']
numpy -> libopenblas[version='>=0.3.3,<1.0a0'] -> libgfortran4[version='7.5.0.*|>=7.5.0']
libopenblas -> libgfortran4[version='>=7.5.0']
assimulo -> libgfortran-ng -> libgfortran4[version='7.5.0.*|>=7.5.0']
scipy -> libgfortran-ng -> libgfortran4=7.5.0
suitesparse -> libopenblas[version='>=0.3.3,<1.0a0'] -> libgfortran4[version='>=7.5.0']
libopenblas -> libgfortran-ng -> libgfortran4=7.5.0
```

Package ca-certificates conflicts for:

```
python=3.8 -> openssl[version='>=1.1.1s,<1.1.2a'] -> ca-certificates
wheel -> python -> ca-certificates
conda-content-trust -> python -> ca-certificates
scipy -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
pip -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
certifi -> python -> ca-certificates
conda -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
openssl -> ca-certificates
setuptools -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
```

Package libcbblas conflicts for:

```
scipy -> libcbblas[version='>=3.9.0,<4.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0'] -> libcbblas[version='>=3.9.0,<4.0a0']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> libcbblas[version='>=3.9.0,<4.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> libcbblas[version='>=3.8.0,<4.0a0']
suitesparse -> libcbblas[version='>=3.8.0,<4.0a0']
```

Package mkl-service conflicts for:

```
numpy -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
suitesparse -> mkl-service[version='>=2.3.0,<3.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> mkl-service[version='>=2.3.0,<3.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0'] -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
scipy -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
```

Package cryptography conflicts for:

```
conda[version='>=22.11.1'] -> pyopenssl[version='>=16.2.0'] -> cryptography[version='>=1.9|>=2.1.4|>=2.2.1|>=2.8|>=3.3|>=35.0']
conda-content-trust -> cryptography
conda -> pyopenssl[version='>=16.2.0'] -> cryptography[version='>=1.9|>=2.1.4|>=2.2.1|>=2.8|>=3.3|>=35.0']
```

Package libuuid conflicts for:

```
conda[version='>=22.11.1'] -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
conda -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
pip -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
wheel -> python -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
numpy -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
certifi -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
conda-content-trust -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
scipy -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
setuptools -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
```

Package tbb conflicts for:

```
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> tbb[version='>=2020.3|>=2021.3.0']
suitesparse -> tbb[version='>=2018.0.4,<2019.0a0|>=2019.1|>=2020.3|>=2021.3.0']
```

Package certifi conflicts for:

```
conda[version='>=22.11.1'] -> requests[version='>=2.20.1,<3'] -> certifi[version='>=2016.09|>=2016.9.26|>=2017.4.17']
setuptools -> certifi[version='>=2016.09|>=2016.9.26']
conda -> requests[version='>=2.20.1,<3'] -> certifi[version='>=2016.09|>=2016.9.26|>=2017.4.17']
pip -> setuptools -> certifi[version='>=2016.09|>=2016.9.26']
wheel -> setuptools -> certifi[version='>=2016.09|>=2016.9.26']
```

Package numpy conflicts for:

```
scipy -> numpy[version='>=1.11.3,<2.0a0|>=1.14.6,<2.0a0|>=1.16,<1.23|>=1.19,<1.25.0|>=1.19,<1.26.0|>=1.21,<1.26.0|>=1.21,<1.25.0|>=1.21,<1.23|>=1.16.6,<1.23.0|>=1.21.2,<1.23.0|>=1.16.6,<2.0a0|>=1.15.1,<2.0a0|>=1.9.3,<2.0a0|>=1.20.3,<1.27|>=1.20.3,<2.0a0']
pyfmi -> scipy -> numpy[version='>=1.11.3,<2.0a0|>=1.14.6,<2.0a0|>=1.16,<1.23|>=1.19,<1.25.0|>=1.19,<1.26.0|>=1.21,<1.26.0|>=1.21,<1.25.0|>=1.21,<1.23|>=1.16.6,<1.23.0|>=1.21.2,<1.23.0|>=1.16.6,<2.0a0|>=1.15.1,<2.0a0|>=1.9.3,<2.0a0|>=1.20.3,<1.27']
assimulo -> scipy -> numpy[version='>=1.11.3,<2.0a0|>=1.14.6,<2.0a0|>=1.16,<1.23|>=1.19,<1.25.0|>=1.19,<1.26.0|>=1.21,<1.26.0|>=1.21,<1.25.0|>=1.21,<1.23|>=1.16.6,<1.23.0|>=1.21.2,<1.23.0|>=1.16.6,<2.0a0|>=1.15.1,<2.0a0|>=1.9.3,<2.0a0|>=1.20.3,<1.27']
assimulo -> numpy[version='>=1.20.3,<2.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0']
```

Package setuptools conflicts for:

```
conda[version='>=22.11.1'] -> setuptools[version='>=31.0.1']
```

```
wheel -> setuptools
conda[version='>=22.11.1'] -> ruamel.yaml[version='>=0.11.14,<0.18'] ->
setuptools
pip -> setuptools
python=3.8 -> pip -> setuptools
```

Package libhwloc conflicts for:

```
tbb -> libhwloc[version='>=2.8.0,<2.8.1.0a0']
suitesparse -> tbb[version='>=2020.3'] -> libhwloc[version='>=2.8.0,<2.8.1.0a0']
```

Package sundials conflicts for:

```
assimulo -> sundials[version='>=6.4.0,<6.5.0a0']
pyfmi -> assimulo[version='>=3.0'] -> sundials[version='>=6.4.0,<6.5.0a0']
```

Package gmp conflicts for:

```
suitesparse -> gmp[version='>=6.1.2']
suitesparse -> mpfr[version='>=4.0.2,<5.0a0'] -> gmp[version='>=6.2.1,<7.0a0']
```

Package metis conflicts for:

```
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> metis[version='>=5.1.0,<5.2.0a0|>=5.1.0,<6.0a0']
suitesparse -> metis[version='>=5.1.0,<5.2.0a0|>=5.1.0,<6.0a0']
```

Package wheel conflicts for:

```
python=3.8 -> pip -> wheel
pip -> wheel
```

Package mkl conflicts for:

```
suitesparse -> mkl[version='>=2018.0.3,<2019.0a0|>=2019.1,<2021.0a0|>=2021.4.0,<2022.0a0']
suitesparse -> mkl-service[version='>=2.3.0,<3.0a0'] -> mkl[version='>=2019.4,<2021.0a0|>=2021.2.0,<2022.0a0']
```

The following specifications were found to be incompatible with your system:

- feature:/linux-64::__glibc==2.31=0
- feature:|@/linux-64::__glibc==2.31=0
- assimulo -> libgfortran-ng -> __glibc[version='>=2.17']
- libopenblas -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- openssl -> libgcc-ng[version='>=7.5.0'] -> __glibc[version='>=2.17']
- python=3.8 -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- scipy -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- suitesparse -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- tbb -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']

Your installed version is: 2.31

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

```
conda 22.11.1
Python 3.8.15
```

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

```
Collecting package metadata (current_repodata.json): - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
/ done
Solving environment: \ | / - \ | / - \ | / - \
| / - \ | / - \ | / - \ | / - \ | /
- \ | / - \ | / - \ | / - \ | / - \
| / - \ | / - \ | / - \ | / - \
The environment is inconsistent, please check the package plan carefully
The following packages are causing the inconsistency:
```

```
- conda-forge/linux-64::tbb==2021.7.0=h924138e_1
- conda-forge/linux-64::numpy==1.24.1=py38hab0fcb9_0
- conda-forge/linux-64::suitesparse==5.10.1=h9e50725_1
- conda-forge/linux-64::scipy==1.10.0=py38h10c12cc_0
- conda-forge/linux-64::libcbblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libopenblas==0.3.21=threads_h78a6416_3
- conda-forge/linux-64::pyfmi==2.9.8=py38h26c90d9_1
- conda-forge/linux-64::assimulo==3.3=py38h71f17ff_1
- conda-forge/linux-64::libblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::liblapack==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libhwloc==2.8.0=h32351e8_1
- conda-forge/linux-64::fmilib==2.4.1=h27087fc_0
- conda-forge/linux-64::sundials==6.4.1=h89a52a3_0
| / - \ | / - \ | / - \ | / - \ | /
- \ | / - \ | done
```

Package Plan

environment location: /usr/local

added / updated specs:
- pyfmi

The following packages will be REMOVED:

libgomp-11.2.0-h1234567_1

The following packages will be UPDATED:

```
ca-certificates      pkgs/main::ca-certificates-2022.10.11~ --> conda-fo
rge::ca-certificates-2022.12.7-ha878542_0
libgcc-ng            pkgs/main::libgcc-ng-11.2.0-h1234567_1 --> conda-fo
rge::libgcc-ng-12.2.0-h65d4601_19
libstdcxx-ng         pkgs/main::libstdcxx-ng-11.2.0-h12345~ --> conda-fo
rge::libstdcxx-ng-12.2.0-h46fd767_19
openssl              pkgs/main::openssl-1.1.1s-h7f8727e_0 --> conda-fo
rge::openssl-1.1.1s-h0b41bf4_1
```

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

```
_libgcc_mutex        pkgs/main::_libgcc_mutex-0.1-main --> conda-fo
rge::_libgcc_mutex-0.1-conda_forge
_openmp_mutex        pkgs/main::_openmp_mutex-5.1-1_gnu --> conda-fo
rge::_openmp_mutex-4.5-2_kmp_llvm
certifi              pkgs/main/linux-64::certifi-2022.12.7~ --> conda-fo
rge/noarch::certifi-2022.12.7-pyhd8ed1ab_0
conda                pkgs/main::conda-22.11.1-py38h06a4308~ --> conda-fo
rge::conda-22.11.1-py38h578d9bd_1
```

Downloading and Extracting Packages

```
Preparing transaction: - done
Verifying transaction: | / done
Executing transaction: \ | / - \ | / - \ | / - \
done
```

BPL_TEST2_Fedbatch setup

Now specific installation and the run simulations. Start with connecting to Github. Then upload the two files:

- FMU - BPL_TEST2_Fedbatch_linux_om_me.fmu
- Setup-file - BPL_TEST2_Fedbatch_explore.me.py

```
In [ ]: %%bash
git clone https://github.com/janpeter19/BPL_TEST2_Fedbatch
```

Cloning into 'BPL_TEST2_Fedbatch'...

```
In [ ]: %cd BPL_TEST2_Fedbatch

/content/BPL_TEST2_Fedbatch/BPL_TEST2_Fedbatch/BPL_TEST2_Fedbatch
```

```
In [7]: run -i BPL_TEST2_Fedbatch_explore_me.py
```

Linux - run FMU pre-comiled 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 [8]: %matplotlib inline
plt.rcParams['figure.figsize'] = [25/2.54, 20/2.54]
```

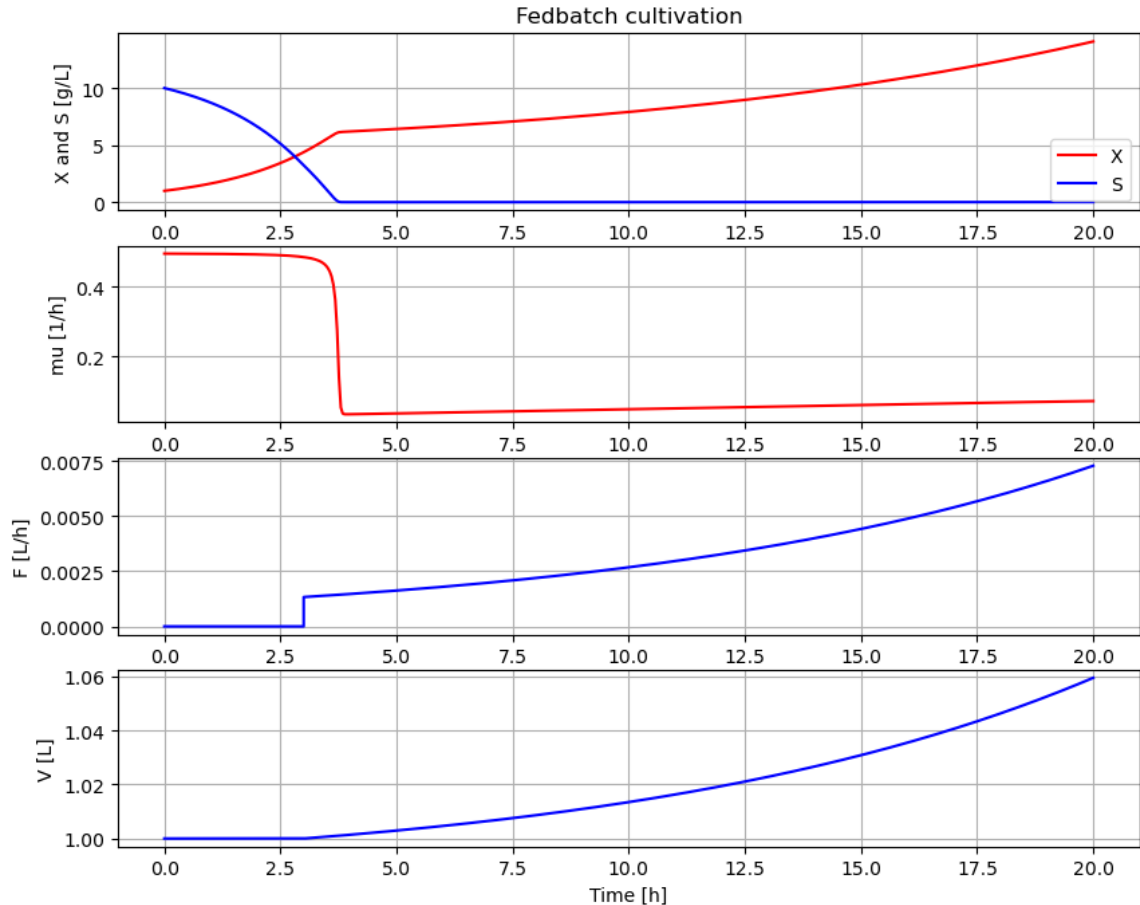
```
In [9]: import warnings
warnings.filterwarnings("ignore")
```

BPL_TEST2_Fedbatch - demo

```
In [10]: describe('culture'); print(); #describe('liquidphase')
```

Simplified text book model - only substrate S and cell concentration X

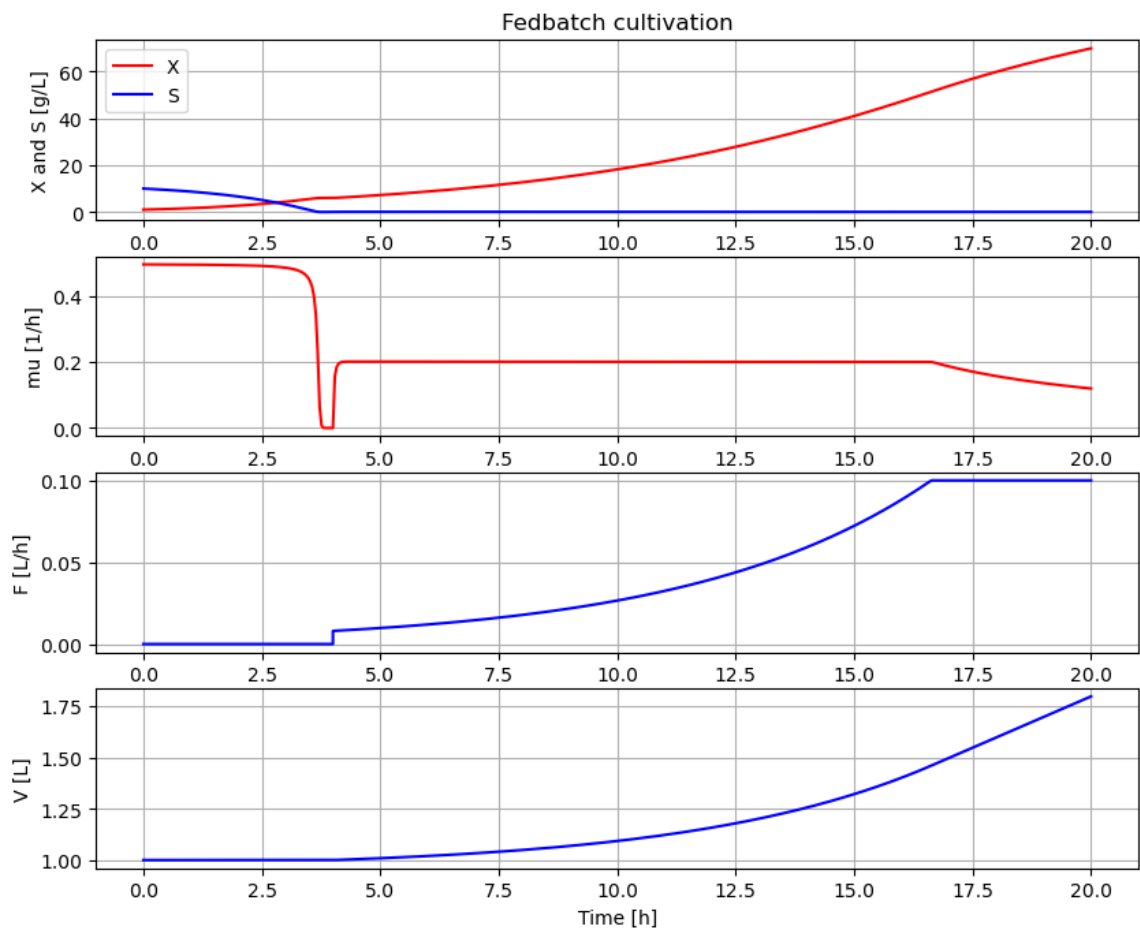
```
In [11]: # Simulation with default values of the process
newplot(plotType='TimeSeries')
simu(20)
```



```
In [12]: disp(mode='long')
```

```
bioreactor.V_0 : V_0 : 1.0
bioreactor.m_0[1] : VX_0 : 1.0
bioreactor.m_0[2] : VS_0 : 10.0
bioreactor.culture.Y : Y : 0.5
bioreactor.culture.qSmax : qSmax : 1.0
bioreactor.culture.Ks : Ks : 0.1
feedtank.c_in[2] : feedtank.S_in : 300.0
feedtank.V_0 : feedtank.V_0 : 10.0
dosagescheme.mu_feed : mu_feed : 0.1
dosagescheme.t_start : t_start : 3.0
dosagescheme.F_start : F_start : 0.001
dosagescheme.F_max : F_max : 0.3
```

```
In [13]: # A more typical feed scheme for the culture at hand
newplot(plotType='TimeSeries')
par(t_start=4, F_start=0.008, mu_feed=0.2, F_max=0.1)
simu(20)
```

In [14]: `disp('culture')`

Y : 0.5
qSmax : 1.0
Ks : 0.1

In [15]: `describe('mu')`

Cell specific growth rate variable : 0.12 [1/h]

In [16]: `describe('parts')`

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

In [17]: `describe('MSL')`

MSL: 3.2.3 - used components: RealInput, RealOutput, CombiTimeTable, Types

In [18]: `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.Fedbatch
- Generated: 2023-01-19T09:29:14Z
- MSL: 3.2.3
- Description: Bioprocess Library version 2.1.1-beta
- Interaction: FMU-explore version 0.9.6

In []: