

BPL_TEST2_Batch - demo

In [1]: `run -i BPL_TEST2_Batch_explore.py`

Windows - run FMU pre-compiled JModelica 2.14

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

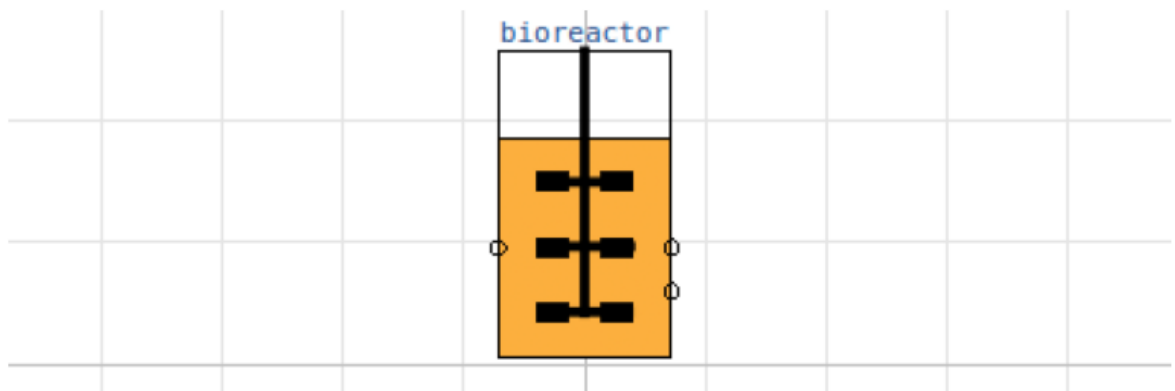
Note that both `disp()` and `describe()` takes values from the last simulation and the command `process_diagram()` brings up the main configuration

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]`

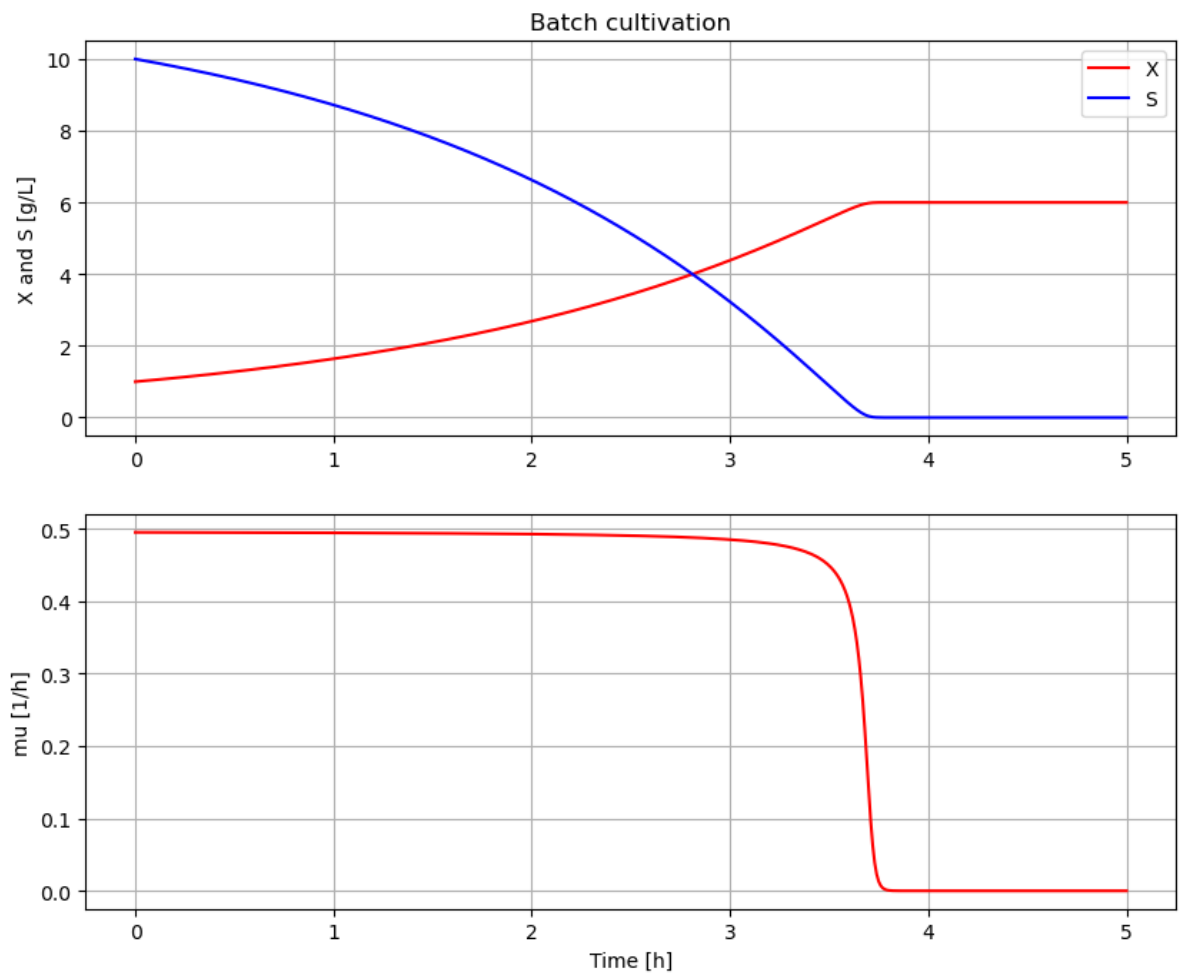
In [3]: `process_diagram()`



In [14]: `disp('bioreactor', mode='long')`

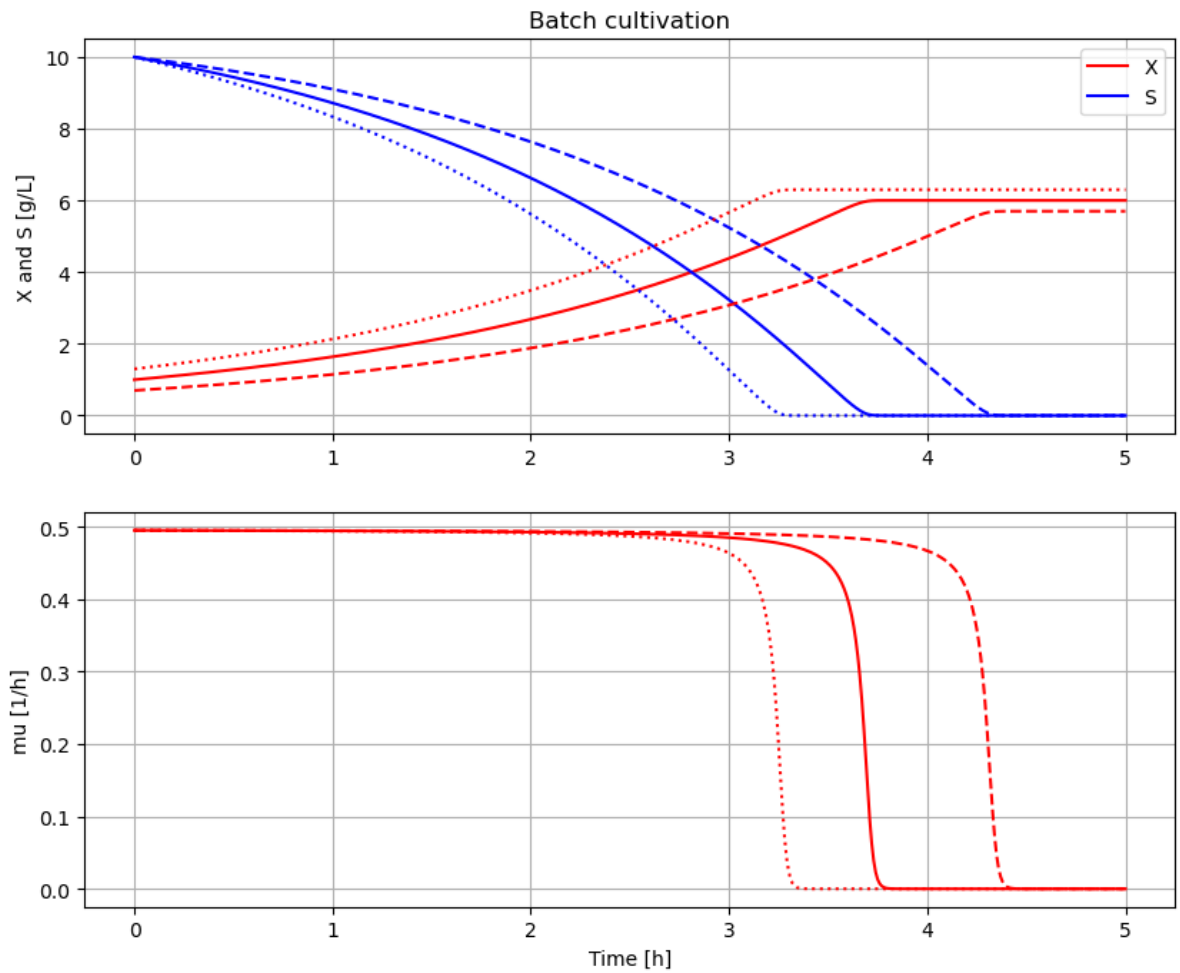
```
bioreactor.V_0 : V_0 : 1.0
bioreactor.m_0[1] : VX_0 : 4.385
bioreactor.m_0[2] : VS_0 : 3.229
bioreactor.culture.Y : Y : 0.4
bioreactor.culture.qSmax : qSmax : 1.25
bioreactor.culture.Ks : Ks : 0.1
```

In [4]: `# Simulation with default values of the process`
`newplot(plotType='TimeSeries')`
`simu()`



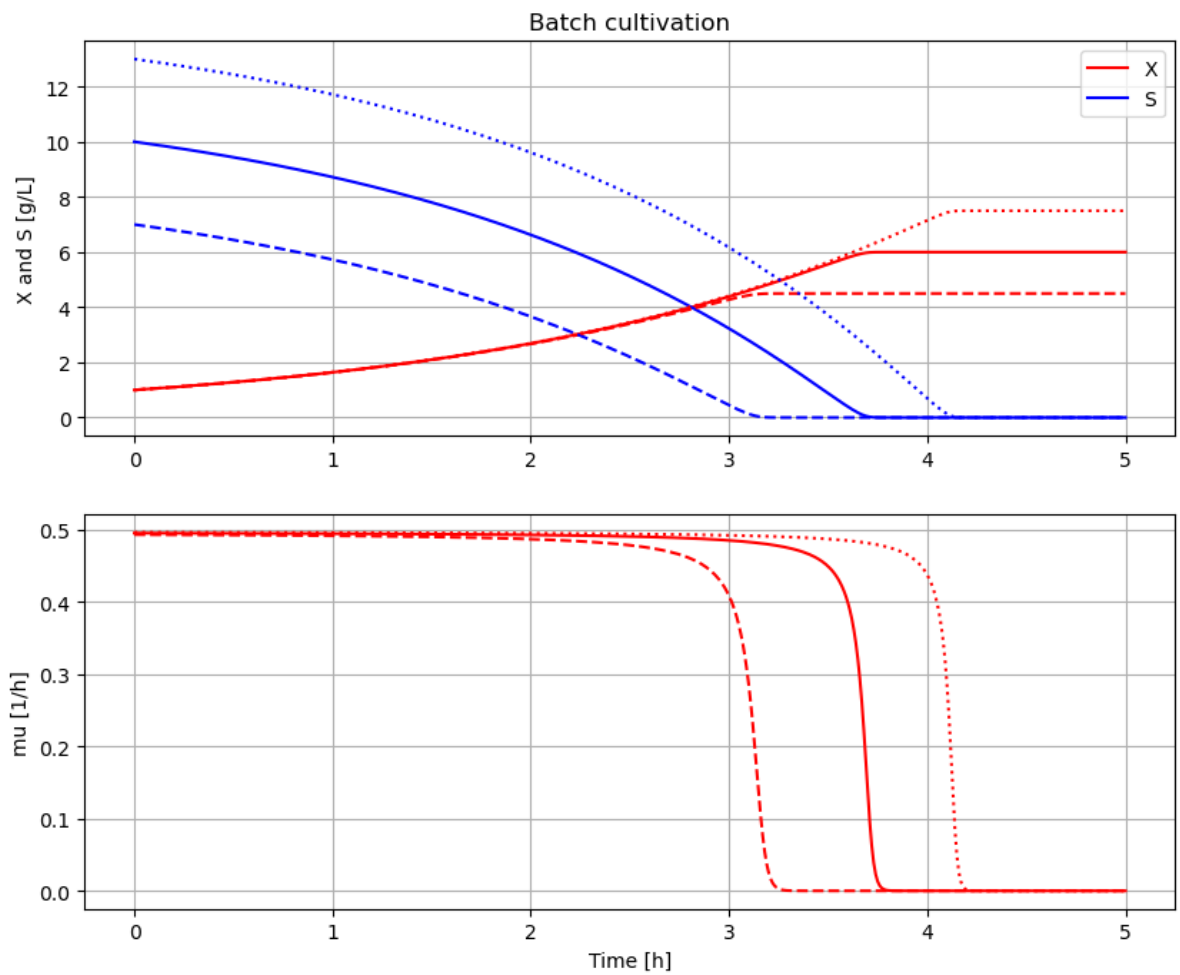
```
In [5]: # Simulation were initial value of biomass VX_0 is varied
newplot(plotType='TimeSeries')
for value in [1.0, 0.7, 1.3]: init(VX_0=value); simu(5)

# Restore default value of VX_0
init(VX_0=1.0)
```



```
In [6]: # Simulation were initial value of substrate VS_0 is varied
newplot(plotType='TimeSeries')
for value in [10, 7, 13]: init(VS_0=value); simu(5)

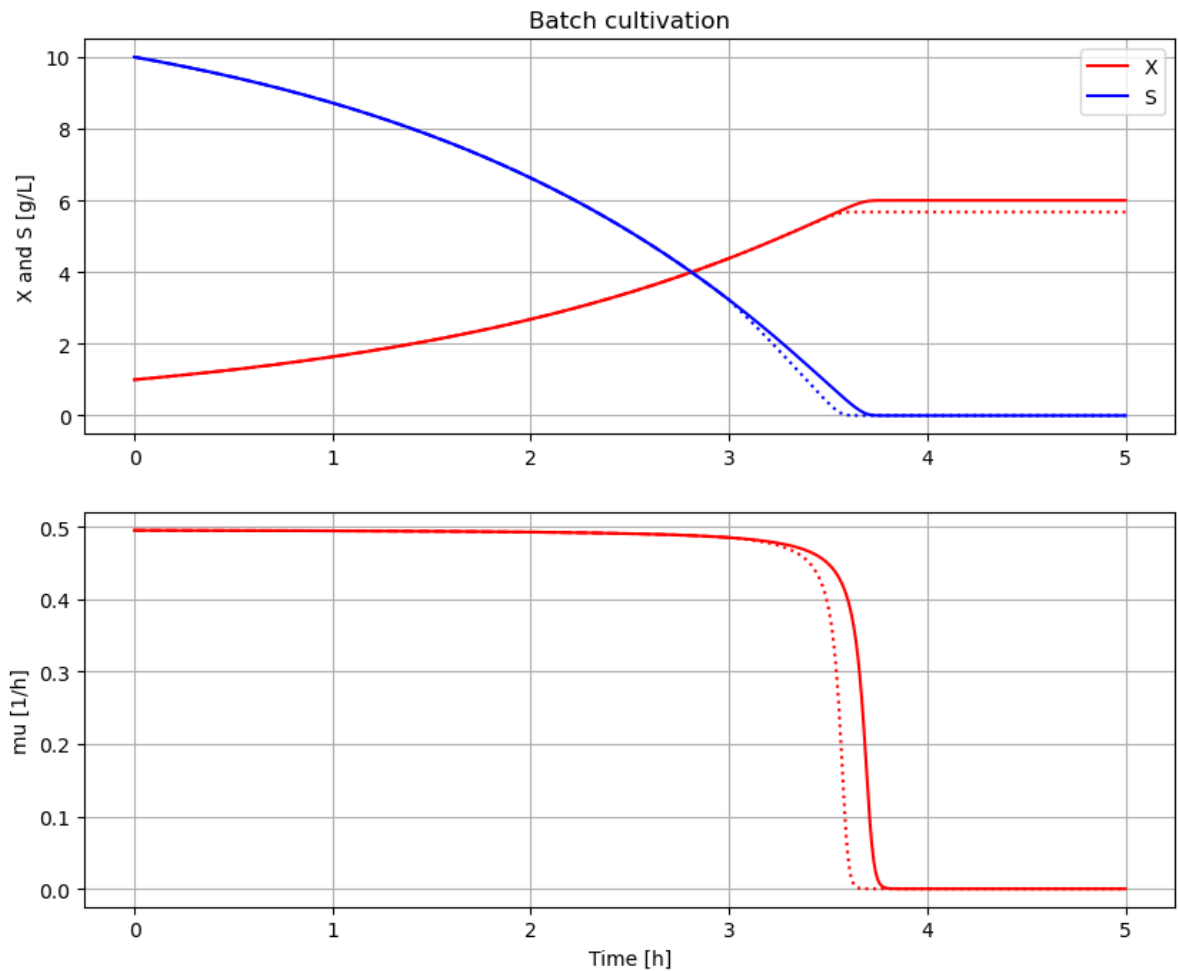
# Restore default value of VS_0
init(VS_0=10)
```



```
In [7]: # Simulation where metabolism is changed after 3 hours
newplot(plotType='TimeSeries')
simu(5)

simu(3)
par(Y=0.4, qSmax=1.0/(0.4/0.5)); simu(2, 'cont')

# Restore default value of Y and qSmax
par(Y=0.5, qSmax=1.0)
```



```
In [8]: disp('culture')
```

```
Y : 0.4
qSmax : 1.25
Ks : 0.1
```

```
In [9]: describe('mu')
```

```
Cell specific growth rate variable : 0.0 [ 1/h ]
```

```
In [10]: describe('parts')
```

```
['bioreactor', 'bioreactor.culture', 'liquidphase', 'MSL']
```

```
In [11]: describe('MSL')
```

```
MSL: none
```

```
In [12]: system_info()
```

```
System information
-OS: Windows
-Python: 3.10.6
-Scipy: not installed in the notebook
-PyFMI: 2.10.3
-FMU by: JModelica.org
-FMI: 2.0
-Type: FMUModelCS2
-Name: BPL_TEST2.Batch
-Generated: 2023-09-02T07:30:42
-MSL: 3.2.2 build 3
-Description: Bioprocess Library version 2.1.2 prel
-Interaction: FMU-explore version 0.9.8
```

In []: