

# BPL\_TEST2\_Fedbatch - demo

In [1]: `run -i BPL_TEST2_Fedbatch_fmpy_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

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

Key system information is listed with the command `system_info()`

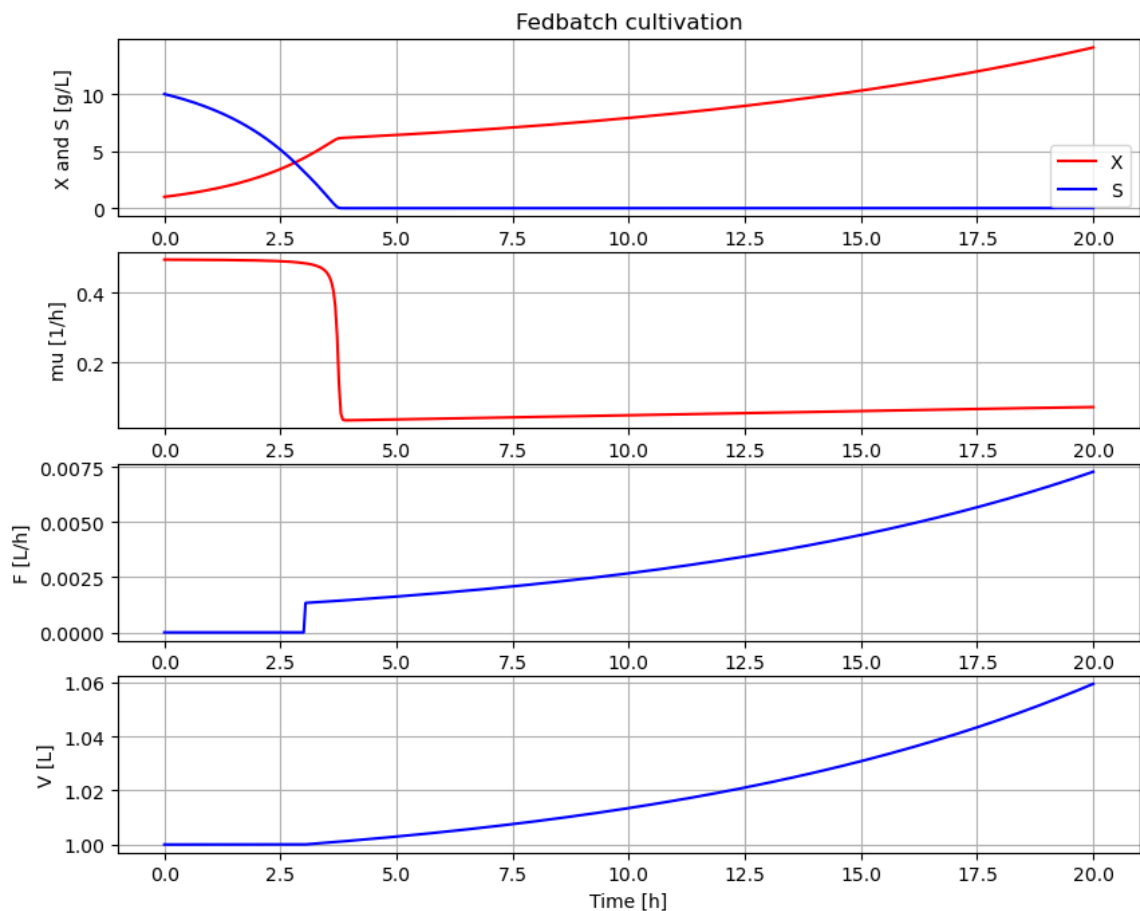
In [2]: `%matplotlib inline`

`plt.rcParams['figure.figsize'] = [25/2.54, 20/2.54]`

In [3]: `# Simulation with default values of the process`

`newplot(plotType='TimeSeries')`

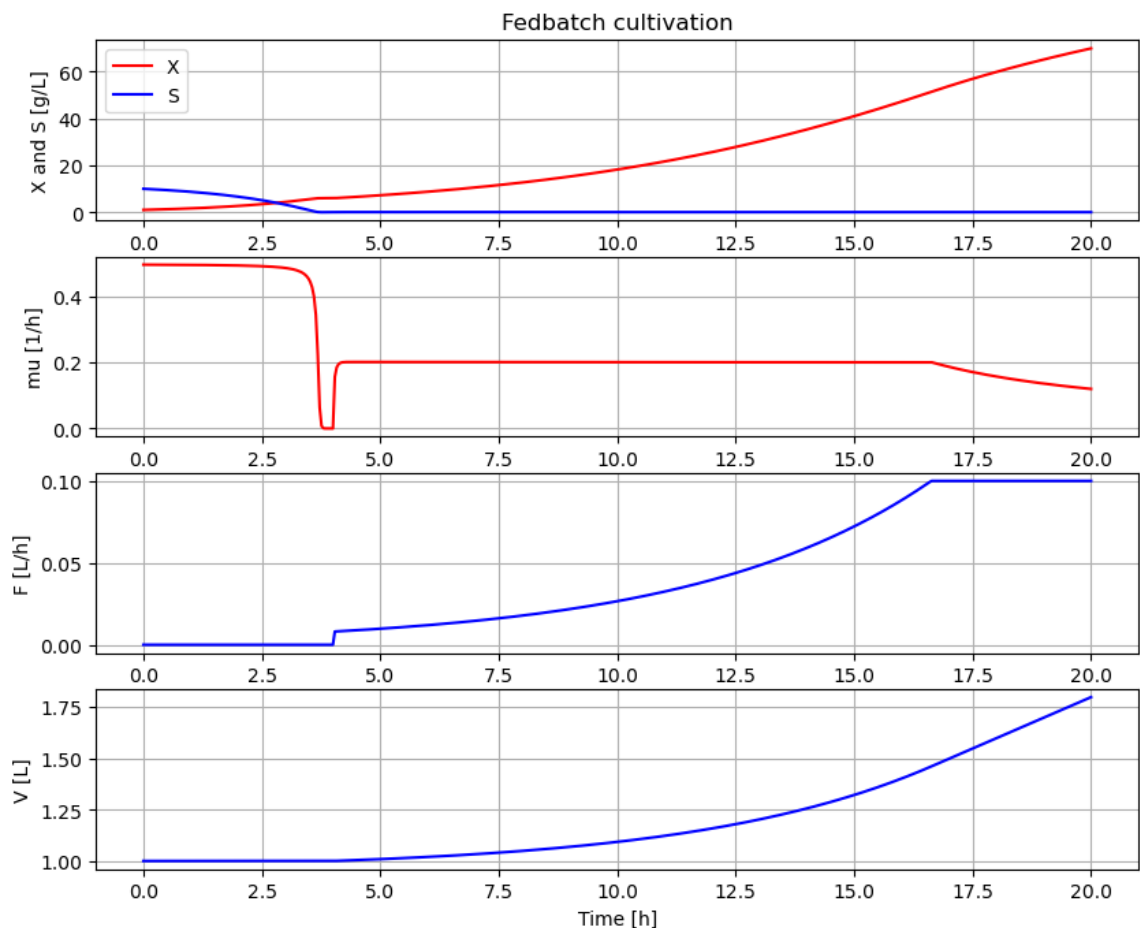
`simu(20)`



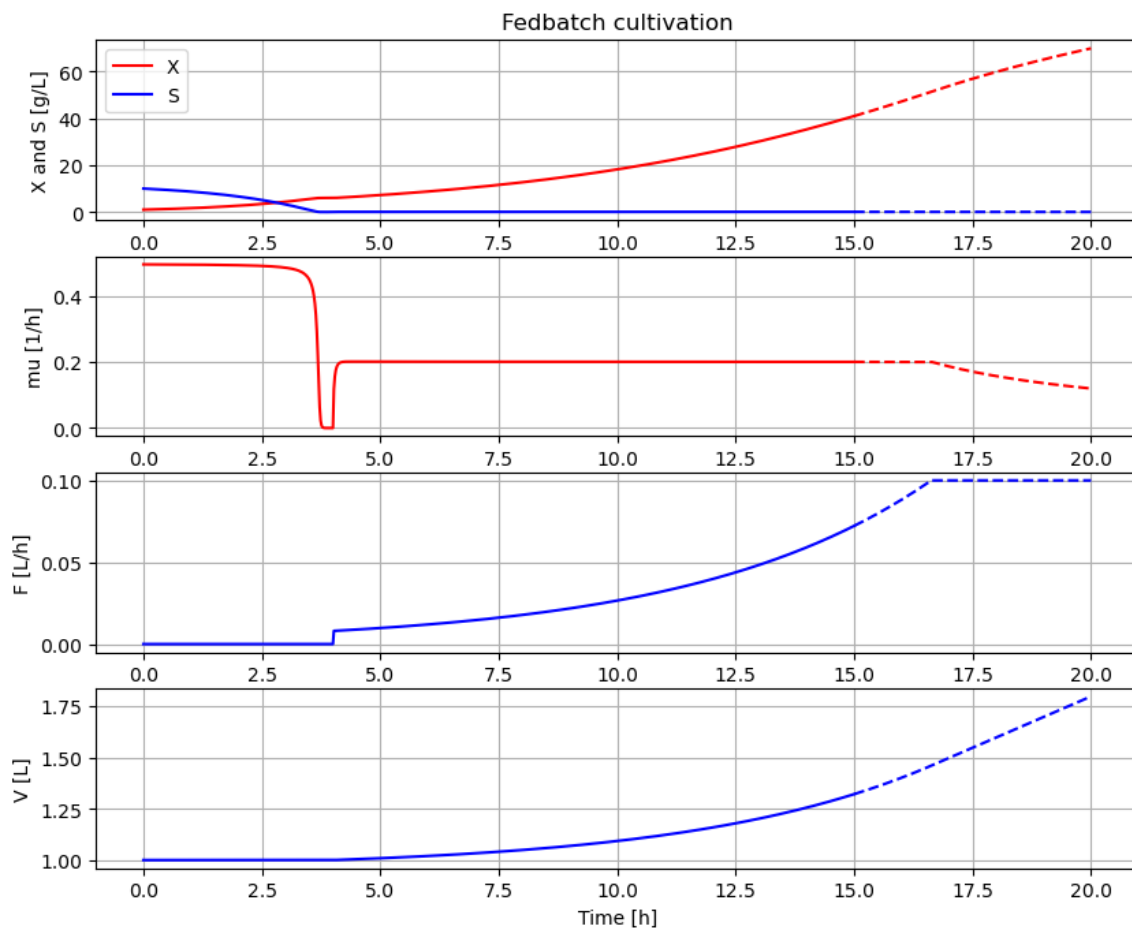
```
In [4]: disp(mode='long')
```

```
bioreactor.V_0 : V_0 : 1.0
bioreactor.m_0[1] : VX_0 : 0.0
bioreactor.m_0[2] : VS_0 : 0.0
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 : 0.0
feedtank.V_0 : feedtank.V_0 : 100.0
dosagescheme.mu_feed : mu_feed : 0.2
dosagescheme.t_start : t_start : 2.0
dosagescheme.F_start : F_start : 0.12
dosagescheme.F_max : F_max : 3.0
```

```
In [5]: # 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 [6]: # Test function simu(mode='cont')
newplot()
simu(15)
simu(5, 'cont')
```



```
In [7]: disp('culture')
```

```
Y : 0.5
qSmax : 1.0
Ks : 0.1
```

```
In [8]: disp('Y', mode='long')
```

```
bioreactor.culture.Y : Y : 0.5
```

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

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

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

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

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

```
MSL: RealInput, RealOutput
```

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

## System information

- OS: Windows
- Python: 3.9.16
- Scipy: not installed in the notebook
- FMPy: 0.3.15
- FMU by: JModelica.org
- FMI: 2.0
- Type: CS
- Name: BPL\_TEST2.Fedbatch
- Generated: 2022-10-17T13:04:04
- MSL: 3.2.2 build 3
- Description: Bioprocess Library version 2.1.0
- Interaction: FMU-explore for FMPy version 0.9.7b

In [ ]: